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Tankiso Moloi
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Towards Digitally Transforming Accounting and Business Processes

Proceedings of the International Conference of Accounting and Business iCAB, Johannesburg 2023

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Tankiso Moloi • Babu George
Editors

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Letter from the Editorial Team

Dear *i*CAB 2023 Delegate,

We greet all of you from the city of gold (Egoli). As editors and on behalf of the University of Johannesburg, College of Business and Economics, School of Accounting, Auckland Park, it is our deepest gratitude to present to you, the conference delegates, the 2023 International Conference of Accounting, and Business conference proceedings.

Yet again, we successfully delivered the 2023 iteration of the iCAB conference. Papers presented in these proceedings have passed through a stringent peer review process, and we are confident that it is only quality papers included in these proceedings. Our review policy is a **double-blind review process,** and this was stringently applied.

A total of 46 papers finally made it into these third ICAB proceedings for publication. Congratulations to all the authors whose manuscripts appear in this volume. ***As can be seen in our analysis no university had a contribution of more than 40% in these proceedings.***

We look forward to having you and your colleagues at the 2024 conference around June/July in South Africa.

Editors

Prof Tankiso Moloi

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Dr. Varaidzo Denhere

Peer Review Statement

The Editorial Team attests that each paper that is part of these proceedings underwent a double-blind peer review process. In regards, each paper was read and evaluated by other scholars with expertise in the subject matt in which the author dealt. Peer reviewers provided analysis to the organizers of the conference on the scholarly significance of the manuscript.

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- Prof Bonang Mohale, Professor of Practice: Johannesburg Business School;
- Prof Busani Ngcaweni, Principal: National School of Governance;
- Ms Jeanine Poggiolini, CEO: Accounting Standards Board;
- Dr Randall Carolissen, Dean: Johannesburg Business School; and
- Prof Amanda Dempsey, Senior Director: School of Accounting, University of Johannesburg.

Second, I acknowledge the selfless work done by all session chairs, co-chairs, and all peer reviewers. You are the ones that make *i*CAB successful.

Third, I acknowledge the Johannesburg Business for providing us with excellent facilities to conduct a successful hybrid conference. I acknowledge the Executive Education Team at JBS. You are an excellent example of what conference facilities should be set like!

Fourth, I acknowledge the work of the conference secretariat under the leadership of Dr. Varaidzo Denhere, assisted by Ms. Justine Nkobane.

Finally, I acknowledge the international steering committee for providing wisdom on the direction of the 2023 conference.

Contents

The Impact of Impression Management Using Minimal Narrative Disclosures in Integrated Reports on the Performance of the top 100 JSE-listed Companies

Aadil Chotia, Mahmood Surty, Yaeesh Yasseen, and Fatima Omarjee

Abstract This paper explores if the top 100 Johannesburg Securities Exchange (JSE)- listed companies utilise impression management strategies through minimal narrative disclosures in their integrated reports and how this impacts their performance. This paper builds on the paper published in The British Accounting Review Journal by Leung et al. (*The British accounting review* 47:275–289, 2015) but focuses on South African-listed companies. A quantitative research approach using statistical methods was used to identify minimal narrative disclosure companies and determine if this was associated with a company's current performance, future performance, or financial distress. This was achieved by using a comprehensive disclosure checklist to identify minimal narrative disclosure companies and a multivariate regression model to determine the related association to performance or financial distress. The paper found that of the sample companies selected, 49% were classified as minimal narrative disclosure companies based on their disclosure scores obtained. The paper further found no association between a company's current performance, future performance and the minimal narrative disclosure score obtained. In contrast, an inverse association was found between a company's financial distress level and minimal narrative disclosure score obtained. This paper extends the body of knowledge within a South African context of the use of impression management in integrated reports by JSE-listed companies using a concealment strategy and is beneficial to academics seeking to explore the effect of impression management in the corporate environment.

Keywords Narrative disclosure · Minimal narrative disclosure · Impression management · King IV

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1 Introduction

A focal point of corporate financial reporting is the quality of financial statements, specifically, transparency in integrated reports (IR) (Leung et al., 2015). Financial reporting quality refers to the accuracy of a company's disclosure relating to its position and operations to enable users of reports to make informed rational decisions (Cohen et al., 2004). A key link exists between a company's financial reporting process, its directors, and the overall quality of financial statements.

Corporate scandals in South Africa such as VBS Mutual Bank and Steinhoff Ltd. have resulted in a credibility crisis in the accounting profession (Yasseen et al., 2020a). More importantly, this has raised concerns over the application of South African corporate governance principles (Rossouw & Styan, 2019). Narrative disclosures in financial reports have been seen as a mechanism to minimise the expectation gap between management and investors (Yasseen et al., 2020b). Narrative disclosures serve as a means of communication which only numerical information may not convey (Rutherford, 2003). IR consist of both regulatory items, such as International Financial Reporting Standards (IFRS) and the King Code IV (KING IV) required narratives which offer an understanding of a company's financials, as well as non-regulatory or discretionary items. Discretionary narrative disclosures provide a vital way for executives to convey valuable information which investors can use for the assessment of the current and future performance of a company (Leung et al., 2015).

Merkl-Davies and Brennan (2007) found that disclosure strategies are used to provide additional useful information or as an impression management method. The impression management school views these narrative disclosures as a way for management to obfuscate and opportunistically disclose information to serve their interests (Courtis, 2004; Godfrey et al., 2003). One way in which impression management is achieved is through the use of a concealment strategy known as minimal narrative disclosure (MND) (Merkl-Davies & Brennan, 2007).

MND is a concealment strategy which results in the presentation of selective information in the IR (Merkl-Davies & Brennan, 2007). MND in IR is a common strategy employed by companies and additional research is required to determine the effect intentional obfuscation of information has on the perceptions associated with a company (Leung et al., 2015; Merkl-Davies & Brennan, 2007). The primary research question of this paper is: Does the management of JSE-listed companies use MND as part of their impression management strategy?

The main research question was answered using the following hypotheses adapted from the original research performed by Leung et al. (2015):

Hp1: Current performance of a company is associated with MND in IR.
Hp2: MND in IR is associated with the future performance of a company.
Hp3: The financial distress of a company is associated with MND in IR.

This paper is quantitative in nature and consists of a sample of JSE-listed companies. The period covered was the 2018 financial year. Impression management strategies include obfuscation of information, thematic manipulation, visual and structural manipulation, performance comparisons and attribution of organisational outcomes (Merkl-Davies & Brennan, 2007). This paper only focused on the obfuscation of information through MND as an impression management strategy.

2 Prior Literature and Theoretical Framework

Disclosures both financial and narrative which are contained in IR have recently been a topic of great interest in the accounting research space (Yasseen et al., 2017, 2019). Impression management is primarily focused on how a company is presented to others so it can be perceived in the most favourable manner (Leung et al., 2015; Merkl-Davies et al., 2011; Yasseen et al., 2017). Merkl-Davies et al. (2011) consider impression management to be a bias in which a positive perception is created by the manipulation of impressions to others. Impression management is derived from social psychology and focuses on how in a corporate context, the management of a company seeks to present the company in the best possible light (Hooghiemstra, 2000). Within a corporate reporting environment, Brennan & Merkl-Davies (2013) found that impression management encompasses the creation of an impression by a company to appeal to the stakeholders to whom they report. If effective, this impression weakens the quality of IR and stakeholders such as shareholders may allocate capital incorrectly (Brennan & Merkl-Davies, 2013).

Impression management given its ability to affect stakeholders can be viewed as being entrenched as part of agency theory (Leung et al., 2015). Agency theory essentially deals with the divergence of interests of the principal (shareholders) and agent (management) (Jenson & Meckling, 1976). As the management of a company may have competing interests with shareholders as a result of performance incentives, they may engage in impression management by choosing what to disclose and what to omit from company disclosures (Leung et al., 2015). Different impression management strategies may be adopted for different stakeholders (Marcus & Goodman, 1991). Financial information is often communicated using written narratives which are occasionally described as unquantified information (Brennan & Merkl-Davies, 2013). The purpose of accounting narratives in IR is to complement and provide additional context to quantified accounting information. Since the majority of accounting narratives in IR are not subject to an audit process, there is a heightened risk that impression management may be utilised to a greater extent (Brennan & Merkl-Davies, 2013).

The argument made by Merkl-Davies and Brennan (2007) is that selectivity entails ‘omitting’ or ‘including’ specific details of the information. This, in turn, is an element of an impression management strategy which is undertaken by some companies. Merkl-Davies and Brennan (2007) further explain that the studies conducted to date on strategies of ‘concealment’ in discretionary narrative disclosures concentrate on examining the content of these disclosures in which selectivity is used in presenting information. MND is one way in which a concealment strategy in connection with selectivity is used in impression management (Merkl-Davies & Brennan, 2007). MND is the action of omitting information on a company's weaknesses or prospects in respect of its current or future performance, as well as financial distress if any in voluntary disclosures (Leung et al., 2015). The reasons why MND is employed by companies include but are not limited to management safeguarding their own interests and standing (Leung et al., 2015). In order to sustain its position of power, management can choose not to disclose voluntary yet vital information on both performance and possible opportunities from stakeholders by using their discretion (Conway et al., 2015). Besides self-interest, managers of a company can be led to suppress corporate information purposefully by employing the tactic of minimal disclosure (Cho et al., 2010; Leung et al., 2015).

There have been mixed findings in the studies relating to the link between concealment strategies and company performance. While Subramanian et al. (1993), Courtis (2004), Leung et al. (2015) and Li (2008) have found an inverse relationship between the use of concealment strategies and company financial performance, Courtis (1995), Smith and Taffler (1992), Clatworthy and Jones (2001) and Rutherford (2003) have not concurred and found that no such relationship exists. The conclusion drawn by Sydserff and Weetman (2002) is that management is fair in exhibiting narrative information, irrespective of the financial performance of the company. These findings on the association between current performance and the level of disclosure made by a company formed the basis for the development of Hp1.

By analysing narrative disclosures provided within IR; Tennyson et al. (1990) compared a corresponding sample of financially distressed and non-financially distressed companies and found that a non-financially distressed company is more likely to disclose its internal functions, development, and expansion aspects, but that this strategic information is often withheld by companies in financial distress. Boo and Simnett (2002) similarly found that companies in financial distress will omit or reduce the disclosure of management's future projections in their IR because of distress and a poor future outlook. Despite the findings from the above studies, Leung et al. (2015) and Miller (2002) argue that financially distressed companies face greater market pressure regarding information on their performance and future outlook given their need for financial assistance from financing institutions. As a result, they would tend to disclose more information in order to avoid the risk of managerial reputation and litigation costs associated with non-disclosure of information but, may engage in MND if there is no need for external funding (Leung et al. 2015; Miller 2002). These findings on the association between financial distress and the level of disclosure made by a company formed the basis of the development of Hp3.

When considering the association between MND conduct and future company performance requirements, MND depends on whether poor performance is temporary or will continue in the future (Leung et al., 2015). Leung et al. (2015) found that where negative performance was persistent, companies were more likely to engage in MND compared to companies that reported positive results in future periods. Barring the findings from Leung et al. 2015, there has not been further studies which consider future performance and MND. The findings on the association between future performance and the level of disclosure made by a company as discussed above formed the basis for the development of Hp2.

The prevalence of MND within IR is thus a common occurrence but concealment of information in IR is not well comprehended (Leung et al., 2015). The pivotal reason non-disclosure in IR requires further understanding is that intentional non-disclosure of material information which is relevant may lead to stakeholders making incorrect decisions based on the information or lack thereof. Preceding impression management studies within the South African context, are focused on agency theory or attribution theory perspectives in Chairmen Statements such as the study carried out by Yasseen et al. (2019) and not on MND in a South African context. This paper explored the voluntary disclosure literature, using disclosure indices and the impression management literature within the South African context. Additionally, this paper focused on the strategy of impression management as a deliberate concealment tool utilised by companies by following the methodology of Leung et al. (2015) conducted in Hong Kong to prove the hypotheses developed and answer the research question. By identifying the disclosures companies omit and their effects on company performance, regulators are provided with a foundation to develop corporate reporting guidelines and possible legislation.

3 Methodology

The research involved the identification of MND companies. MND behaviour was identified by quantifying the level of omission of voluntary narrative disclosure within IR. The voluntary disclosure by companies in their IR was contrasted based on anticipated and actual voluntary disclosure. To contrast the anticipated and expected voluntary disclosures made, a standard level of required narrative disclosures was required on the company's operating, financial, strategic, and overall performance which shareholders would use to assess the company to make an informed decision when investing (Leung et al., 2015).

This paper used the guidelines applied by the Working Committee of the Annual Report Award Competition of Singapore as the basis for determining the standard level of voluntary narrative disclosure as was done in the paper by Leung et al. 2015. The working committee developed their guidelines based on voluntary disclosure which regulators, professional bodies and industry experts view as exemplary. The guidelines were reviewed for items which are unique to Singapore and may reasonably not be expected for a JSE-listed company to disclose or address. No items were identified which needed to be removed as the guidelines are not country specific.

The comprehensive disclosure guidelines are presented in Annexure 1. A company received a score of 1 if it disclosed information on the specific guideline in its IR and a score of 0 if it did not disclose any information on the guideline in its IR. MND companies were identified as companies with a relatively low overall disclosure score based on the 76 guidelines for disclosure. A company was classified as an MND company if its total disclosure score was less than 41.8. Companies with a disclosure score of 41.8 or more were considered non-MND companies. This differed from the classification parameters set by Leung et al. (2015) for the following reasons:

- The application of King IV is a requirement of JSE-listed companies, requiring a greater number of disclosures in the IR.
- When the original paper was performed it was the first year in which IFRS was required in Hong Kong (2005), whereas currently within the South African context, IFRS is a long-standing requirement for companies listed on the JSE.
- The International Integrated Reporting Council has increased the scope of non-financial disclosures in the IR.

3.1 Research Instrument and Data Analysis

After a company was identified as an MND company, to explore Hp1-Hp3, two multivariate regression analyses were performed. This involved controlling for the costs associated with disclosure, demand for external financing and market competition.

3.2 Hypotheses: Hp1 and Hp3

Regression model 1 adapted from Leung et al. (2015) was used to assess if there was an association between an MND company and its current performance as well as financial distress level as detailed below.

Regression model 1.

$$\begin{aligned} MNDCi = {} & ai + b1ROAi + b2TOBINQi + b3DISTRESSi + b4NEWEQUITYi \\ & + b5DEBTi + b6LIQUIDi + b7HHIi + b8SIZEi + b9BIG4i + b10LISTi \\ & + b11SEGi + b12GROWTHi + b13LCEOOWNi + b14DUALITYi \\ & + b15PINDi + INDDUMMIES + ei \end{aligned}$$

Where:

MNDC = a dummy variable for MND companies that equals 1 if the company's total actual disclosure score was less than 41.8 of the maximum possible scores of the full disclosure checklist and 0 otherwise.

ROA and TOBINQ were two measures of current performance.

ROA = returns on assets, measured as the ratio of net income (before tax and interest) over total assets.

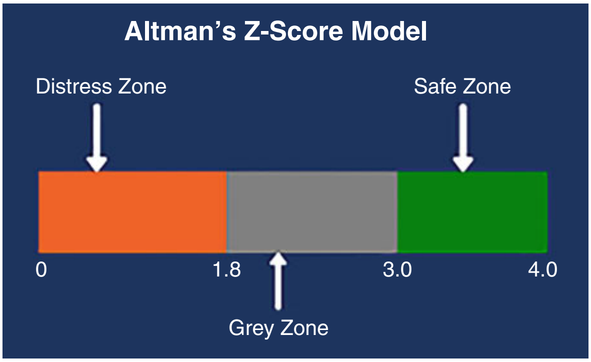

Fig. 1 Altman's Z-score model scale (Image sourced from: https://corporatefinanceinstitute.com/resources/knowledge/credit/altmans-z-score-model/. The Altman's Z-scores Grey zone has several different interpretations of the Grey Zone (example 1.1 > Grey Zone>2.6). The scale presented in Fig. 1 is used in this Paper)

TOBINQ = Tobin's Q, measured as the ratio of the sum of the market value of equity and total debts over total assets.

DISTRESS = financial distress measured by Altman's Z-score (Altman & La Fleur, 1981). Altman's Z-score was used as a tool used to measure the risk of insolvency that a company faces through the following calculation:

$$Z = 1.2X1 + 1.4X2 + 3.3X3 + 0.6X4 + 1.0X5,$$

Where:

X1 was the ratio of working capital to total assets.
X2 was the ratio of retained earnings to total assets.
X3 was the ratio of earnings before interest and taxes to total assets.
X4 was the ratio of the market value of equity to the book value of total liabilities.
X5 was the ratio of sales to total assets.

Altman's Z-score is generally interpreted using the following scale (Fig. 1):

NEWEQUITY = a dummy variable that equalled 1 if the company issued more than 5% of common equity during the year.

DEBT = the debt ratio of long-term debts to total assets.

LIQUID = the liquidity ratio of the sum of cash and short-term investment to total assets.

HHI = the Herfindahl Hirschman Index, which is a widely used measure of market competition, calculated as the sum of the squared market share based on net sales in the 2-digit SIC industry.

Other control variables were selected based on previous studies on voluntary disclosure (Ahmed & Courtis, 1999; Lang & Lundholm, 1993) and include;

BIG4 = dummy variable that equalled 1 if a company was audited by a Big-4 auditor, and 0 otherwise. LIST = a dummy variable that equalled 1 if a company was cross listed on an overseas exchange, and 0 otherwise.

SEG, which is the number of business and geographic segments to proxy for business complexity.

GROWTH = which is company growth in total assets.

The researchers included in the model the percentage of CEO ownership (CEOOWN), CEO duality (DUALITY = 1 if the CEO was also Chairman of the company) and the proportion of independent non-executive directors (PIND). Likewise, the researchers included the 2-digit SIC industry dummies (IND_DUMMIES) to control for industry effects on the likelihood of nondisclosure in IR.

A negative coefficient of ROA and TOBINQ suggested that companies with poor performance are more likely to engage in concealment of voluntary narrative information (Leung et al., 2015) and assisted the researchers in answering research Hp1.

A positive coefficient of DISTRESS suggested that a company with a higher insolvency risk would tend to obfuscate investors through minimal narrative disclosures in the IR (Leung et al., 2015). This assisted the researchers in answering Hp3. The results of the control variables also provided valuable insight into the other factors that could influence minimal narrative disclosures in companies despite not answering the hypotheses (Leung et al., 2015).

To measure a company's current performance, data on a company's return on assets (ROA) and Tobin's Q (the ratio of the sum of the market value of equity and total debts over total assets) were gathered. To measure the financial distress of a company, Altman's Z-score was used.

The t-statistic significance and a confidence level of 95% were used to assess the statistical significance of the variables.

The mean, median, standard deviations and minimum and maximum values were observed for each variable in regression model 1 and for the different categories in the disclosure body namely:

- Actual disclosure score for the "company overview, objectives and strategy" category.
- Actual disclosure score for the "operating review" category.
- Actual disclosure score for the "financial review" category.
- Actual disclosure score for the "general" category.

These descriptive statistics allowed the researchers to observe whether voluntary disclosure regarding specific categories is high or low and provide insight to users regarding specific topics or information companies choose to be silent about or avoid disclosing.

3.3 Hypothesis: Hp2

Regression model 2 adapted from Leung et al. (2015) was used to assess the association between an MND company and its future performance.

Regression Model 2

To test whether the future performance of non-disclosure companies improves or deteriorates (Hp2), the researcher estimated the following change model:

$$\Delta \mathrm{PERFi} = \mathrm{ai} + \mathrm{b1MNDCi} + \mathrm{b2}\Delta \mathrm{Ti} + \mathrm{b3}\Delta \mathrm{DISTRESSi} + \mathrm{b4}\Delta \mathrm{EWEQUITYi} + \mathrm{b5}\Delta \mathrm{DEBTi} + \mathrm{b6}\Delta \mathrm{LIQUIDi} + \mathrm{INDDUMMIES} + \mathrm{ei}$$

Where:

All the change variables are calculated as the differences between the 2019 and 2018 financial years.

ΔPERF = the changes in ROA (ΔROA).
MNDC = the dummy variable classifying MND and non-MND companies.
ΔTA = the changes in total assets over the two years.
ΔDISTRESS = the changes in Altman's Z-score.
ΔEWEQUITY = the changes in the issue of new equity over the two years.
ΔDEBT = the changes in leverage.
ΔLIQUID = the changes in liquidity over the two years. IND_DUMMIES controls the variation in industry performance in the subsequent year.

To assess the future performance of company data relating to changes in ROA, total assets (TA), Altman's Z-score, equity issued, and liquidity were gathered.

A significant statistical (measured by using a t-statistic significance and a confidence level of 95%) negative coefficient on MNDC for changes in ROA suggested that, compared with the rest of the sample companies, those engaging in concealment through MND in IR would report deteriorating performance in the following year. This suggested that the current poor performance was not transitory. This assisted the researchers in answering Hp2.

3.4 Data Collection

The IR of each company was obtained from each of listed company's website. The financial data for the variables to be used in the regression were obtained from the JSE, IRESS South Africa Financial reporting database or by manual collection where applicable. The statistical results derived from these methods were completed with the help of a statistician.

3.5 Population and Sample

The population was all companies listed on the JSE. The IR which were investigated related to the 2018 financial year and only narrative disclosures were examined. As part of determining the effect of MND in IR of the 2018 financial year and its association with future performance, the 2019 performance of each sampled company was considered as part of this paper. A purposive sample was used in this research as it was time and cost-effective. This sampling technique was appropriate as the researchers selected the sample size, based on the entities with the highest market capitalisation. Companies with the highest market capitalisation usually have the largest number of shareholders and users of IR. The tactic of impression management through MND will be most apparent if applied by these companies. The IR of the top 100 JSE-listed companies were obtained. However, the sample size was 79 companies (n = 79) as it excluded companies in the financial sector as these companies are subject to distinct regulatory disclosure procedures and companies for which reliable market-related data could not be obtained.

4 Findings

4.1 Disclosure Index Score Results and Key Informational Characteristics of Non-disclosure

The results obtained and represented in Fig. 2 show that just under half of the companies sampled were classified as MND companies as their disclosure score were less than 41.8 (55% of the total). This illustrates that the MND companies did not communicate with stakeholders on 45% or greater of potential narrative disclosure items in IR. These findings suggest that some companies from the selected sample are selective in the information disclosed within IR. This further suggests that the discourse of voluntary items in South Africa is still fairly low, looking at the

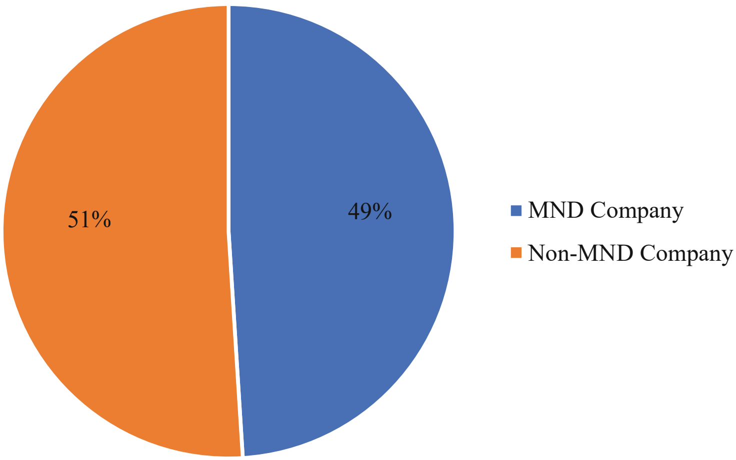

Fig. 2 Proportion of MND companies and non-MND companies

Table 1 Descriptive statistics of the variables

	N	Mean	Std dev	Minimum	Maximum	Median
MND Company	79	0.414	0.503	0.000	1.000	0.000
Company, objectives, and strategies	79	11.278	1.560	7.000	15.000	11.000
Operating review	79	16.785	1.669	13.000	21.000	17.000
Financial review	79	8.278	1.724	5.000	12.000	8.000
General	79	5.101	1.549	2.000	10.000	5.000

JSE-listing requirements to prepare IR and that disclosure of voluntary narratives while positive is still developing in South Africa.

Table 1 provides the descriptive statistics for the variables in this paper. The mean overall disclosure scores were 11.278 out of 20 of the possible disclosure items for “Company overview”, “objectives and strategies”; 16.785 out of 29 for “Operating review”; 8.278 out of 16 for “Financial review” and 5.101 out of 11 for “General”. These results suggest that companies tend to disclose more on the overall direction and objectives of the company than on the operations and financial aspects in voluntary disclosure. This may point to the possible use of MND on items which in the short term could impact investor sentiment. The mean total disclosure score for MND companies was 41.4 out of the maximum possible score of 76 representing 54.47% of the disclosure checklist. This indicated that companies may view some disclosures as more important than others. These results confirm prior findings made by Conway et al. (2015), Merkl-Davies and Brennan (2007) and the original study by Leung et al. (2015) that management of companies are selective in their choice of disclosure.

4.2 Hp1 and Hp3

4.2.1 Hp1

Regression model 1 allowed the researcher to conclude on Hp1 and Hp3. The regression analysis presented in Table 2 revealed that there is no association between a company’s current performance and its MND score. In terms of both variables used as a measure for current performance, namely, ROA and TOBINQ, the results are not statistically significant (at both the 0.05 and 0.1 level). There is no evidence, in terms of Hp1, to support the statement that companies with poor current performance are more likely to engage in the concealment of voluntary narrative disclosures in IR. This finding differed from the original study carried out by Leung et al. (2015), which found that there is an inverse association between a company’s performance and MND score. The findings, however, are in line with prior research on concealment strategies carried out by Courtis (1995), Smith and Taffler (1992), Clatworthy and Jones (2001) and Rutherford (2003) which found no such association exists.

Table 2 Logistic Regression results

	Coefficients	Significance	Exp(B)
ROA	4.167	0.371	64.500
TOBINQ	0.675	0.278	1.965
DISTRESS	−0.664	0.034*	0.515
NEWEQUITY	−0.272	0.790	0.762
DEBT	2.436	0.347	11.425
LIQUID	3.387	0.071**	29.568
HHI	−13.164	0.405	0.000
Market Capitalisation	0.000	0.163	1.000
Size (Natural log)	1.179	0.014*	3.252
BIG4	1.794	0.190	6.013
SEG	−0.098	0.273	0.907
GROWTH	1.189	0.553	3.284
CEOOWN	0.025	0.326	1.025
PIND	−0.009	0.635	0.991
Constant	−25.435	0.042	0.000

*, and ** denote statistical significance at the 0.05 and 0.1 levels respectively

4.2.2 Hp3

The DISTRESS variable in Table 2 which was used as a measure of financial distress is statistically significant at the 0.05 level. There indicated that there is an association between a company's financial distress levels and its MND score. However, the results for financial distress showed a significantly negative coefficient (−0.664) which indicated that companies with a higher insolvency risk are inclined to disclose more information in their IR. This supports the statement by Miller (2002) that whilst the financial distress of a company is associated with MND in IR, companies choose to disclose more information using narratives when facing increasing levels of financial distress. This finding however differs from that of Leung et al. (2015), which found a positive correlation between MND score and the level of financial distress.

The results on the control variables in Table 2 further illustrate that the SIZE variable is statistically significant at the 0.05 level and has a positive coefficient (1.179). Whilst Leung et al. (2015) found an inverse relationship between size and MND score, in a South African context the results indicate that smaller companies disclose more information. A possible reason for this could be the need for smaller companies to obtain financing in the future in order to grow the company (Miller, 2002).

The results of the liquidity control variable (LIQUID) in Table 2 were significant at the 0.1 level and had a significant positive coefficient (3.387). This illustrated that, despite a company's liquidity increasing and the company requiring less external funding, companies still choose to disclose more information by means of voluntary narratives and not decrease or conceal information in IR. This finding differed from that of Leung et al. (2015) which found that there is an inverse relationship between liquidity and a company's MND score. This may be due to voluntary disclosures having a beneficial effect on both liquidity and company value and that these effects are plausibly causal, providing a justification to companies for voluntarily disclosing more information than is mandated (Balakrishnan et al., 2014).

The results also show that all other control variables such as CEO ownership and other corporate governance variables are not associated with minimal disclosure behaviour as these variables are not statistically significant at the 0.05 and 0.1 levels as was found in the original study by Leung et al. (2015).

Overall, the results in respect of financial distress support Hp3, that there is an association between a company's MND score and level of financial distress however, this is an inverse association, resulting in more information disclosed as financial distress increases. These findings are contrary to that of Leung et al. (2015) which found a positive association between a company's MND score and level of financial distress.

4.2.3 Hp2

Regression model 2 was used to investigate Hp2. The results from regression model 2 are reported in Table 3 and reflects the analysis of whether MND companies experience performance deterioration or improvement in the subsequent year. All the change variables were calculated as the differences between the 2018 and 2019 financial years. In the original paper by Leung et al. (2015), companies which reported deteriorating performance in the following year signalled that current poor performance was long-lasting.

Contrary to the findings of the study performed by Leung et al. (2015), the results in Table 3 reveal that there is no statistical significance for the MND company variable at the 0.05 level (or 0.1 level). This illustrated that there is no evidence to conclude that MND in IR is correlated in any way with the future performance of an

Table 3 Regression model 2 results for changes in the future performance of MND companies

Coefficients						
Model		Unstandardised coefficients B	Unstandardised coefficients Std. Error	Standardised coefficients Beta	T	Significance
1	(Constant)	−0.161	0.141		−1.142	.257
	MND Company	−0.018	0.198	−0.009	−0.094	0.926
	ΔTA	1.487	0.749	0.243	1.984	0.051
	ΔDISTRESS	0.935	0.165	0.554	5.671	0.000[a]
	ΔEQUITY	−0.089	1.278	−0.008	−0.070	0.944
	ΔDEBT	−0.277	0.249	−0.106	−1.111	0.270
	ΔLIQUIDITY	−0.161	0.272	−0.058	−0.592	0.556

[a]Denotes statistical significance at the 0.05 level

MND company (whether future performance improves or deteriorates) within the context of this research.

The results also reveal that the ΔDISTRESS variable is statistically significant at the 99% confidence level and has a positive coefficient. This, expectedly, results in the deterioration of an MND company's future performance as the company experiences more financial distress (measured using the Altman's-Z score as expressed within the Methodology section). All other change variables within the results are shown not to be statistically significant and do not affect the company's future performance (ΔPERF).

Overall, in respect of Hp2, the results of regression model 2 do not support the statement that there is an association between a company's MND score and future performance. This finding differed from that of Leung et al., 2015, which found that where negative performance was consistent and continued in a future period, there was an association between a company's MND score and future performance.

5 Conclusion

The purpose of this paper was to determine if the top 100 JSE-listed companies utilised impression management strategies, specifically MND in their IR and its related impact on their performance. This was explored through the use of disclosure guidelines against which the narrative disclosures made in IR by the sampled companies were analysed. The research further focused on the types of information management a company may choose to conceal and explored possible reasons for the non-disclosure, particularly as annual reporting frameworks call for greater transparency in reports.

The results from the collected data revealed that from the sample of 79 companies selected, 49% of these companies were classified as MND companies based on their disclosure score obtained from the disclosure guidelines. The paper also revealed that there is no association between a company's current performance and its MND score. However, the results revealed that there is an inverse association between a company's financial distress levels and the MND score of the company, as companies facing financial distress disclosed more information. No evidence was obtained to support that MND in IR relates to a company's future performance.

The results obtained differed from the findings of Leung et al. (2015) which found that there is an association between a company's MND score compared to current performance and future performance. Both papers found an association between financial distress levels and the MND score of a company however, Leung et al. (2015) found that companies facing financial distress would tend to disclose less information if there was no need for external funding whilst this study found the opposite to be true. Both papers concluded that the management of companies utilises impression management as a strategy by selectively choosing the type of information disclosed within IR. A limitation of this paper is that it consists of only a sample of JSE-listed companies and is not representative of all JSE-listed companies. Furthermore, this paper only covers the IR for the 2018 financial year and the focus was placed primarily on the obfuscation of information through MND as an impression management strategy. Future areas of research can include expanding on investigating impression management strategies in narrative disclosures within other countries and regions to expand on the body of knowledge. Additionally, within a South African context future research can focus on specifically exploring the reasons, such as incentives and disincentives, linked to a company being classified as an MND company.

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The Role of Tax Transparency Reporting in Corporate Governance and Social Responsibility Reporting

Justine Gomolemo Nkobane

Abstract More firms are choosing to be more forthcoming with their tax information. What could be the reason for this change? This study examines the link between tax transparency reporting in corporate governance and corporate social responsibility reporting (CSR). Previous studies have been focused on tax avoidance and the link between corporate governance and CSR. This study systematically reviews literature to understand the role of tax transparency reporting in corporate governance and social responsibility reporting. The realisation that a number of multinational firms such as Amazon, Starbucks and Google pay virtually no tax has sparked public debate. These firms "tax practices may have been legal, but the "tax shaming" of these firms has resulted in public outrage and brand boycotts. The study investigated whether corporate governance and CSR are motivating companies to disclose their tax affairs voluntarily in their annual financial reports. The literature review revealed that the payment of taxes is a form of CSR. The study further revealed that good corporate governance equates to more voluntary disclosure of information and that good CSR disclosures are adversely aligned to tax aggressiveness, however the act of paying taxes outweighs other voluntary tax disclosures with regards to contributing towards CSR efforts. Therefore, for tax transparency to be perceived in a positive light, companies must pay taxes beyond any other voluntary tax disclosures. This link could be extremely useful to regulators and business managers so that they can strive to meet their corporate governance and social responsibility mandate through tax transparency disclosures.

Keywords Tax Transparency · Corporate Governance and Social Responsibility

1 Introduction

"Tax transparency isn't coming–it's already here." (Alexander, 2013).

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Until 7 March 2023 reporting non-financial information on tax has largely been voluntary, however guidelines do exist, and more companies are choosing to improve their tax transparency, although it is not mandatory. Companies are motivated by distinct reasons that lead them to disclose information voluntarily in their annual financial reports. The purpose of this study is to investigate whether corporate governance and CSR are two of the reasons for this.

The aim of corporate governance is to balance the interests of a company's stakeholders (King III, 2009). On the one hand, it can be argued that tax transparency disclosures should fulfil the interests of most stakeholders, as this appears to be one of the largest expenses for a company. On the other hand, prior literature indicates that managers believe they benefit more from tax avoidance because that enables them to meet the company's profit bottom line (Sikka, 2010; Fisher, 2014). This demonstrates that managers (who are also stakeholders) have significant power to influence the company and if they believe an action to be necessary that is what the company will implement (Armstrong et al., 2015).

EY (2013) is of the view that being more transparent about tax is beyond simply being responsive to key stakeholders now demanding more information. This illustrates that tax transparency goes beyond fulfilling the corporate governance needs of society. Transparency places the organisation in a position to engage effectively with its stakeholders, in doing so, it becomes evident that tax transparency fulfils certain needs of stakeholders and can be seen to achieve or enhance corporate governance in organisations. In addition, EY (2013) also highlighted that there are other stakeholders involved, such as consumers, non-governmental organisations and the media, who are nowadays much less likely to read detailed financial statements. These stakeholders focus on the companies' contribution to the economy and whether the behaviours of the company conform to the norms of society. Other groups of stakeholders, therefore, view tax transparency and paying taxes as the action of a company meeting its CSR objectives (EY, 2013).

Deloitte (2016) issued a report detailing the key tax transparency developments in 2015/2016. Broad transparency trends and developments include:

- Increased disclosure of total taxes paid/tax contributions by companies. Most companies disclosed the split between different taxes paid and contributed.
- Disclosure of tax-related governance: the majority provided details of the processes for setting and adhering to tax policies and strategies.
- The expectation of businesses to assess their broader stakeholder needs in relation to the tax information.

As a result, Deloitte (2016), argues that more companies are choosing to disclose information voluntarily because it helps them to fulfill their corporate governance responsibilities, as well as their corporate social responsibilities.

Previous studies have been centered on understanding the advancements in tax research in financial statements and the applicability to tax avoidance (Graham et al., 2012; Hanlon & Heitzman, 2010; Wilde & Wilson, 2018). However, the role of tax transparency in corporate governance and CSR has been neglected. The benefits of tax transparency depend on whom the information is to be provided to and for what purpose (PWC, 2013). For tax transparency to play a role in CSR, it must be seen to benefit the public, to be aware of tax information and to legitimise the company.

The objective of the study is to investigate whether corporate governance and CSR are possible reasons for companies voluntarily disclosing tax information. This objective was satisfied by using a systemic review of literature. Venter et al. (2016) argue that, on average, companies that are more transparent in their tax disclosures are also strong in governance and social performance. The remainder of the study is structured as follows: Section 2 provides a review of the literature on accounting theories, corporate governance, CSR and tax transparency initiatives. Section 3 explains the methodology. Section 4 presents the results and Sect. 5 explains the results, concludes the study, and suggests areas for future research.

2 Literature Review

2.1 Theories

2.1.1 Legitimacy Theory

"Legitimacy consists of generalised perceptions or assumptions that the actions of an entity are desirable, proper or deemed socially appropriate by norms, values or beliefs." (Suchman, 1995). Legitimacy theory asserts that organisations are continually seeking to ensure they are perceived as operating within the norms imposed by society (Deegan, 2013).

According to Lenter et al. (2003), society's beliefs were focused on disclosure, which was seen to be legitimate, mainly because it was perceived to facilitate supervisory controls and prevent firms from abusing their power. It was also seen to deliver socially desirable behaviour to society. In 1924, public disclosure was enforced for both individual and corporate taxpayers. In that year, the New York Times published taxes paid by thousands of people together with prominent names of corporations and individuals who had paid no income tax (Lenter et al., 2003). However, many opposed this system of making tax returns public as they argued that by disclosing the names of wealthy taxpayers made them targets of fraud and that business secrecy would be compromised. Shortly afterwards the law was changed so that only the names and addresses of taxpayers and not their tax liabilities were public (Lenter et al., 2003). Therefore, it appears that according to society, it was illegitimate to disclose taxes due to the drawbacks that came with disclosing—fraud, for example.

According to O'Donovan (2002), corporations with elevated levels of legitimacy will try to alter public perceptions. This negates the aspect of legitimacy theory that states that if society's expectations about performance change, an organisation will need to show that it is also changing (Deegan, 2013). According to Sari and Prihandini (2019), disclosure is done to reduce community concerns and ensure the community's concerns regarding the company are addressed.

Davis et al. (2016) indicates that companies increase ESG (Environmental Social Governance) disclosures in order to alleviate community concerns regarding low tax payments in order to increase legitimacy. Therefore, as per the legitimacy theories premise voluntary tax disclosures would occur if the disclosures were perceived to legitimise the entity.

2.1.2 Agency Theory

Agency theory is the relationship between principals and agents in business, and it is concerned with resolving problems that can exist in agency relationships due to unaligned goals or different appetites for risk (Deegan, 2013). Agency relationships are common in the financial advisory field, and therefore an agent may advise a principal to be transparent—or not—with their tax reporting. Whatever the agent does is on behalf of the principal.

According to the USA (United States of America), one of the concerns in 2002 was that companies were overstating their revenues for financial accounting purposes and understating their income for tax purposes (Lenter et al., 2003). This was an illegal practice that tainted the principal. Further analysis revealed that this was done by the financial advisers (agents) and not the principals. In this situation, the agent did not want to disclose tax matters because in doing so the illegal activity occurring would become known to the public and the principal, as well as the agent, would lose their credibility in the public eye. This illustrates that tax transparency is considered good if it meets the needs of important stakeholders and the company (Hansen & Wernerfelt, 1989).

2.1.3 Stakeholder Theory

There are some similarities between legitimacy theory and stakeholder theory as both theories conceptualise the organisation as part of a broader social system. Stakeholder theory, however, provides a more refined resolution by referring to groups within society (Deegan, 2013). In 1976, proponents of public disclosure of corporate tax return information argued that disclosure will aid government regulators to improve the functioning of financial markets, promote increased tax compliance, and increase political pressure for an honest tax system (Lenter et al., 2003). According to Lenter et al. (2003), disclosure was conducted because it would satisfy all stakeholders' needs, regardless of the power they held, and the business is managed for the benefit of all stakeholders. Being forthcoming with tax information is for the benefit of all stakeholders as the entity is then transparent. Examples of stakeholders in an organisation are shareholders, creditors and the government.

The ethical branch of the stakeholder theory indicates that all stakeholders have the same rights to be treated fairly by an organization. The ethical branch of the stakeholder theory implies that the theory has a true CSR. (Deegan, 2013).

Therefore, voluntary tax disclosure as per the stakeholder theory will occur if it is perceived to achieve the corporate social responsibility mandate.

Based on the stakeholder view it is implied that tax payment is a pivotal element of a company's CSR practices (Lin et al., 2017). A motive for the disclosure of more CSR is to ensure stakeholders perceptions are managed. Healy and Wahlen (1999); Yuthas et al. (2002) have indicated that managers use financial disclosures and their judgement in financial reports as an impression management tool in order to influence the perceptions and decisions of stakeholders.

2.1.4 Institutional Theory

The institutional theory considers the form of organisations and provides explanations for organisations in a similar field in business tending to take on similar characteristics and form in business (Deegan, 2013). It allows a view of economic resource dependency incentives for accounting rule choice (Deegan, 2013). Institutional theory views organisations as operating within a social framework of norms, values and elements that constitute appropriate or acceptable economic behaviour (Matten & Moon, 2008).

In 1934 a Senate Committee on Banking and Currency Investigation of Financial Institutions, motivated by the 1929 stock market crash, revealed that many owners had not paid income tax in the years since the crash. Furthermore, the USA Congress decided to have publicity provisions inserted in the 1934 Revenue Act which raised individual income tax rates marginally higher for high-income earners (Lenter et al., 2003). It is evident from the occurrences in 1934 that institutions in the same field, in this case, financial institutions, react similarly. Most of them did not pay their taxes during the stock market crash or for a while afterwards, which was the norm for the industry at the time.

However, after the publicity provision was inserted, it was a way to demonstrate the honesty of tax administrations by preventing officials from favouring high-income taxpayers (Lenter et al., 2003). Financial institutions started paying their income taxes because tax information would be public knowledge.

2.2 Corporate Governance

Corporate governance is a system of rules and practices by which a company is managed (Tricker & Tricker, 2015). Companies that voluntarily disclose information are focused on the needs and interests of stakeholders, which indicates that there is a link between corporate governance and tax transparency (PWC, 2016). Corporate governance can be described according to two opposing models, one being the shareholder model and the other being the stakeholder model (West, 2006). The shareholder model is based on the belief that a company is an extension of its owners (shareholders). In contrast, however, the stakeholder model view is that a company has a responsibility towards the various shareholders (West, 2006). There is a common belief that companies with better governance disclose more information to external parties and are more transparent, due to the monitoring occurring in the entity (Beekes et al., 2016). Corporate governance structures in place in common law countries are expected to encourage corporate disclosure mainly because failure to disclose may result in penalties and reputation loss for the managers of the company (Beekes et al., 2016).

According to West (2006), the corporate governance model in South Africa is one in which the company is seen as a social entity that has a responsibility towards its many stakeholders. This implies that companies may view tax transparency as a crucial element. According to King IV (2016), those charged with governance must oversee and monitor economic activities, and this includes ensuring that the entity adheres to a transparent tax policy (King IV, 2016). Those in governance positions, directors and CEO's (Chief executive officers) play a key role in selecting a tax management strategy (King IV, 2016). Minnick and Noga (2010) are of the view that governance plays a role in tax management because those in charge of governance are charged with a responsibility to ensure allocation of resources, including the management and payment of taxes. Companies with better governance do not have lower effective tax rates, but they do pay less in cash taxes (Minnick & Noga, 2010). This illustrates that if tax is managed effectively by those charged with governance activities, then it can become a value-maximising activity, further illustrating that good corporate governance is complemented by tax management (Brown et al., 2011).

One of the foundation stones of King IV (2016) is stakeholder inclusivity. The stakeholder, who is the manager in this case, is there to ensure that companies understand the legitimate needs and expectations of a company's major stakeholders (King IV, 2016). Currently, some companies have appointed a corporate stakeholder relationship officer whose task is to communicate with stakeholders and keep management informed (King IV, 2016). The implementation of stakeholder inclusivity, therefore, illustrates that corporate governance is perceived by companies as a crucial element. Because of stakeholder management, it can further be deduced that if stakeholders are interested in or require tax transparency disclosures, those responsible for corporate governance will ensure that this is communicated to government and so stakeholder needs are fulfilled.

A recent worldwide trend indicates that company management acts to minimise corporate taxes through tax aggressiveness activities (Lanis & Richardson, 2011). Being tax aggressive has both negative and positive effects. The benefits are tax savings for the companies; however, that can become negative if companies must pay penalties and suffer reputational risk from not paying equitable taxes (Lanis & Richardson, 2011).

The literature provides contradictory evidence on the link between corporate governance and tax avoidance. Desai and Dharmapala (2006) are of the view that tax avoidance reduces corporate transparency, which in turn allows managers to use the resources to grow the company. Therefore, entities might not be transparent with their taxes, but still use their profits for the growth of the company, and this could still satisfy the needs of some stakeholders. However, Minnick and Noga (2010) found that the link between corporate governance and tax avoidance was virtually non-existent.

Deegan (2013) is of the view that different managers will have different perceptions about how society expects the organisation to behave. Therefore, the legitimacy theory may or may not apply to society in general, as different managers have different perceptions about society's expectations. It is, however, important to note that stakeholders with power will make the decisions on what to disclose, if it aligns with their views about what benefits society (Deegan, 2013).

Integrated thinking and corporate governance are strongly and positively correlated (Venter et al., 2016). Furthermore, it was found that companies with elevated levels of integrated thinking are more transparent with their tax information; this implies that tax transparency disclosure is a part of fulfilling the company's corporate governance initiative and integrated thinking requirements (Venter et al., 2016).

There are no legal or moral reasons compelling directors to engage in tax evasion or avoidance (Sikka, 2010). There are also no laws in place that require directors to increase profits by specifically avoiding taxation, therefore, directors will choose to increase profits at the expense of not paying taxes if this improves the profit bottom line thereby increasing profits and ensuring sustained growth (Hasseldine & Morris, 2013). There might also be a role that tax transparency plays in corporate governance, but this might not be significant enough for the entity to pay taxes and to be transparent about this (Hasseldine & Morris, 2013). CG and CSR support compliance with financial transparency and information disclosure (Popescu, 2019).

2.3 Corporate Social Responsibility (CSR)

CSR is topical in both business and academics (Brooks & Oikonomou, 2018). According to the principles illustrated in Principles for Responsible Investment (PRI), paying the fair share of taxes is among the key ESG factors (Gasperini, 2020). CSR is the corporation's initiative to assess and take responsibility for the company's influence on society that goes beyond that which is required by regulators (National Academy of Sciences;, 2007). Lanis and Richardson (2011) argue that the higher the level of CSR disclosure in a corporation, the lower the level of corporate tax aggressiveness. The results from Lanis and Richardson's (2011) study were that the higher the level of CSR disclosure of a corporation, the lower the corporate tax aggressiveness and that the relationship between CSR disclosure and tax aggressiveness is negatively significant.

The corporate world has changed; CSR was once considered the sole responsibility of the state. However, businesses are now expected to voluntarily and actively mitigate climate change to ensure that the environment in which they operates is protected (Gjølberg, 2009). Stakeholder's expectations of companies have changed, and CSR is an important initiative for citizens because it is now the responsibility of corporates as well (Gjølberg, 2009). According to King IV, one of the governing body's responsibilities is to ensure that the organisation is seen to be a responsible citizen and for them to do this, must ensure compliance with the South African Revenue Service (SARS) legislation (King IV, 2016).

Concerns regarding tax disclosures emerged due to the scandal surrounding ENRON and the pressure for companies to be more transparent in tax management, predominantly concerning taxes being paid in developing countries (Muller & Kolk, 2015). The reason for this was that CSR in developing countries involves contributing towards taxes (Muller & Kolk, 2015). The downside is that developing countries are faced with challenges in enforcing tax legislation as well as monitoring the implementation of laws and legislation and this creates an opportunity for tax avoidance on the part of multinational entities (Muller & Kolk, 2015).

Muller and Kolk (2015) argue that due to their size, multinational enterprises (MNEs) are exposed to scrutiny from various stakeholders when they decide to implement low CSR activities. This may result in reputational risk, as they are regarded as irresponsible. Furthermore, if MNEs perceive tax to be a component of CSR then MNEs will appear to be more socially responsible in their business operations, specifically regarding taxation (Muller & Kolk, 2015).

The payment of taxes provides for corporate claims of social responsibility as it allows for wealth to be transferred to society through the government (Sikka, 2010). According to Sikka (2010), the act of paying taxes is being socially responsible. Companies may excel at talking about social responsibility and the activities they perform, but they still go to great lengths to evade taxes, thereby illustrating that the two may not be positively linked at all (Sikka, 2010).

In the Starbucks case, CSR was seen by society as actually paying taxes and not just being transparent about the tax liability, or in the Starbucks situation, being transparent about a lack of tax liability (Campbell & Helleloid, 2016). Although Starbucks had a brand and a good reputation for CSR in other spheres of their operations, this disintegrated quickly in the United Kingdom (UK) when it was discovered that they paid no corporate taxes (Campbell & Helleloid, 2016). Even though Starbucks ensured it paid its workers a fair wage and that it was ethical in its interactions with suppliers, society questioned their CSR, indicating that what they were doing correctly was not enough for them to disregard the fact that they were not paying any taxes (Campbell & Helleloid, 2016). To illustrate this, in 2013 (the year following the UK tax avoidance reports), Starbucks reported the first-ever decline in UK sales (Campbell & Helleloid, 2016), demonstrating that citizens view the act of paying corporate tax as fulfilling CSR. The payment of income tax is now seen as a dimension of CSR, and it continues to draw attention from regulators, legislators and the media (Campbell & Helleloid, 2016).

Global CSR initiatives are different from one another. This indicates that CSR activities are not only related to firm-specific factors, but also to the political economy in which they function and factors such as whether the economy is national or international (West, 2006).

There are a few companies that refer to the payment of taxes in their CSR reports; however, their claims of ethics, integrity, honesty and transparency should apply to all aspects of their business (Sikka, 2010). It is interesting to note that CSR was abandoned by many developing world companies until the recession in the United States of America (USA) in 2008, which awakened leaders and resulted in them taking more responsibility for ensuring that business gives back to the communities in which they operate (Suliman et al., 2016).

Ho and Wong's (2001) results supported the notion that large companies disclose more information than smaller companies. The reason for this could be that society's expectations of large companies are greater because they make greater profits from the community and society would is anxious to know how the profits are being utilised.

According to the UK Human Rights Act, 1998, companies are entitled to the peaceful enjoyment of their possessions. A company's focus is thus on their needs, as well as shareholder needs: the community in which it operates is a secondary factor. Entities will pay taxes and be transparent if they have achieved their profit bottom line and if the shareholders are satisfied with dividends, resulting in "enjoyment" for them (UK Human Rights Act, 1998).

A study done in Egypt showed that the higher the likelihood of tax avoidance, the higher the level of CSR disclosure of a company (Abdelfattah & Aboud, 2020. This alludes to the idea that firms that have engaged in tax avoidance will likely increase CSR disclosure to alleviate potential public concerns and to appease the community (Abdelfattah & Aboud, 2020).

2.4 Overview of Tax Transparency Initiatives

Countries worldwide are reacting to the continuing progression of tax transparency reporting (KPMG, 2016). Since 2010 several initiatives have been implemented and proposed by many bodies all over the world. In SA, the reporting of tax numbers is required in terms of International Financial Reporting Standards (IFRS) and until recently the only other initiative is the CbCR (Country by Country Reporting) required by SARS. Intentionally the focus on tax transparency reporting has heightened as a result of trade and the spread of the digital economy (Stiglingh et al., 2017) Since 2010, several initiatives that can be voluntarily adopted by companies in any country have been proposed and implemented by organisations around the globe. At first, the initiatives focused on the extractive industries and the financial industries. Soon afterwards more country-specific initiatives were implemented, such as disclosure on base erosion and profit shifting (BEPS) implemented by the Organisation for Economic Co-operation and Development (OECD) and European Union (EU) directives on accounting and transparency, CbCR initiatives and the automatic exchange of information. BEPS refers to instances where the interaction of different tax rules leads to double non-taxation, to no taxation or to low taxation, by shifting profits away from the jurisdictions where the activities creating those profits occur (OECD, 2015). These initiatives are briefly discussed below.

2.4.1 Extractive Industry Transparency Initiatives (EITI)

Requirements for the extractive and logging industries are documented in the EITI Standard (EITI, 2016). These requirements apply to listed and unlisted companies active in the oil, gas, mining or logging sectors and that need to report specific obligations. Companies must report to governments, all payments categorised by county and all tax payments per project if specifically due to a project (EITI, 2016).

The EITI is a voluntary initiative founded in 2003 in which countries around the world commit to publishing reports on how governments manage the oil, gas and mining sector. The principle behind EITI stems from the belief that a country's natural resources belong to its citizens. The EITI report requires companies to publish how much tax they pay, as well as royalties, and for the government to publish how much was actually received (EITI, 2016).

The EITI is perceived as the solution to weaknesses in governance, specifically in resource-rich developing countries (Eigen, 2006). Advocates for EITI believe that if firms disclose payments to government, citizens will be able to hold government accountable (Eigen, 2006). From the above, it appears as though tax transparency will be fulfilled through disclosures of payments and corporate governance with the implementation of EITI and through the management of EITI.

On the 19th of March 2014, USA became the first G8 country to be accepted as an EITI candidate; subsequently, Germany and the UK have been accepted as candidates. Currently, there are 51 countries implementing EITI, 17 supporting countries and dozens more supporting companies in the oil, gas and mining industry as well as various natural resource civil societies (EITI, 2016).

In 2016 a revised standard was launched that aimed to improve the EITI's quality assurance mechanisms to determine to what extent implementing countries are adhering to EITI compliance requirements. The standard requires that countries that bid, operate or invest in extractive projects must also declare their beneficial owners (EITI, 2013). As of the first of January 2021, all EITI implementing countries are required to publish new and amended contracts for extractive projects (EITI progress report, 2021).

Hence, the aim of the initiative is to improve the transparency of payments made to governments all over the world. This also allows citizens of resource-rich countries to hold the companies responsible by ensuring that they contribute to taxes so that the funds can be used for CSR by governments for the benefit of society (EITI Act, 2013).

2.4.2 Dodd-Frank Act

Consistent with the EITI, the USA launched its own initiative regarding tax transparency disclosure as part of the Dodd-Frank Act which focuses on financial regulatory reform and consumer protection (USA Dodd-Frank Act, 2011). The full name of the Act is the Dodd-Frank Wall Street Reform and Consumer Protection

Act, but it is often referred to as the Dodd-Frank (CNBC, 2012). The Dodd-Frank Act was founded by the Consumer Financial Protection Bureau, whose aim is the protection of consumers from unfair and abusive financial products and services (Consumer Financial Protection Bureau, 2010). The Act came into force after the financial crisis in the USA in 2008 to prevent similar crises in future, and it places extensive regulations on the financial industry (Consumer Financial Protection Bureau, 2010).

The Act requires that capital banks increase the amount of reserves so that they can deal with future losses that may arise. Similarly, the Act calls for a substantial portion of assets to be in a form that can be easily liquidated if cash is required (therefore less long-term loans)) (USA Dodd-Frank Act, 2011).

More requirements are in place for the nation's biggest banks with an asset value of $50 billion or more. The big banks are required to submit to annual stress tests that determine whether they would survive a hypothetical severe financial crisis like the one in 2008. Large banks are also required to seek approval before increasing dividends or authorising an issue of new share repurchases (share buy-back) (USA Dodd-Frank Act, 2011).

Even among the big banks there are larger banks that are referred to as the '"global systemically important banks" (G-SIBs), which should hold even more capital, referred to as G-SIB surcharge. These banks are also required to submit yearly resolution plans detailing how, in the event of bankruptcy, they would resolve a crisis without harming the financial markets in which they operate, (USA Dodd-Frank Act, 2011).

2.4.3 Base Erosion and Profit Shifting (BEPS)

BEPS actions relate to CbCR, disclosures relating to tax strategies (including tax planning) and transfer pricing policies that apply at a company level (Stiglingh et al., 2017). The aim of the OECD was to achieve sustained economic growth, employment and to improve the standard of living of citizens in the countries that are members of the OECD (OECD, 2004). The OECD (Organisation for Economic Co-Operation and Development) principles were initially issued in 1999 and have become the international benchmark for corporate governance around the world (OECD, 2004). In 2004 new principles for OECD governments were agreed upon (OECD, 2004). The new principles in OECD (2004) were to ensure that six key areas of corporate governance were addressed:

1. ensuring the basis for effective corporate governance framework;
2. the rights of shareholders;
3. the equitable treatment of shareholders;
4. the role of stakeholders in corporate governance;
5. disclosure and transparency; and
6. the responsibilities of the board.

There has been some strain on the international tax framework due to the integration of national economies and markets. Rules that were in place revealed weaknesses that gave rise to the BEPS tax planning strategy that resulted in policymakers ensuring that profits are taxed specifically where the economic activity takes place. During September 2013, G20 leaders endorsed the Action Plan on BEPS. The action plan was agreed on by the G20 countries (OECD, 2015). According to Trends in Tax Transparency (Deloitte, 2016), there are other tax transparency initiatives that came about because of the OECD BEPS project. Specifically relevant to tax transparency reporting is Action Point 12. This requires taxpayers to disclose their aggressive tax planning arrangements and Action Point 13 that re-examined transfer pricing documentation. In 2015 the OECD finalised Action Point 13 of the BEPS plan that now requires disclosure of tax profits and other financial information to be provided to tax authorities (OECD, 2015).

2.4.4 EU Directives on Accounting and Transparency

Shortly after the introduction of the proposed Dodd-Frank Act in the USA amendments to the EU Accounting and Transparency Directive were also proposed. Another EU initiative, the EU Capital Requirement Directive published in the Official Journal of the EU in June 2013 proposes tax reporting for companies in the financial sector.

The Capital Requirements Directive IV introduced new rules regarding corporate governance, and these rules have been enhanced to ensure better risk management. The directive also introduced additional information relating to transparency and disclosure requirements for individuals who earn more than €one million per year (CFA Institute, 2013).

The rules present in the Accounting Directive are aimed at targeting certain EU entities active in the extractive and logging industry. The rules require payments to governments to be reported on a CbC basis. The new accounting directive reduces the current burden on small companies by simplifying the preparation of financial statements and the information required to be in the notes. As part of the process of replacing the old Accounting Directives, the commission examined and opted to reject the option to adopt the IFRS for small and medium-sized enterprises at EU level and opted to reject this because it did not appear to reduce the administrative burden on small companies (EU Directive IV, 2013).

The Transparency Directive extends the provisions of the Accounting Directive to all companies in the extractive and logging industries listed on the recognised stock exchanges in the EU, irrespective of their country of incorporation or registration. First, the revised transparency directive closes a pre-existing gap in the notification requirements by requiring the disclosure of large holdings of all financial instruments that could be used to acquire economic interest in listed companies. Second, the requirement to publish quarterly financial information was removed to reduce the burden of administrative costs and encourage long-term investment (EU Directive IV, 2013).

The European Parliament has approved both the new Accounting and Transparency directives. The purpose of these directives was intended to reduce the administrative burden facing small companies, to increase the transparency of payments to governments by the extractive industry and loggers of primary forest and to create a mandatory requirement for Country-by-country reporting (CbCR) (EU Directive IV, 2013).

2.4.5 Country-by-Country Reporting (CbCR)

CbC reporting is different from regular financial reporting, mainly because countries are now required to publish information for every country in which they operate (EU Directive IV, 2013). The objective of the proposed country by country reporting requirement in Accounting and Transparency Directives is to level the playing field across companies and improve the transparency of payments made to governments all over the world by the extractive and logging industries (EU Directive IV, 2013). The EU disclosure requirements are like the US Dodd-Frank Act requirements but differ with regards to two areas firstly the industries and applicability of listed and unlisted companies (EU Directive IV, 2013). Country-by-country (CbC) applies to multinational significant global entities, and it is intended to reduce tax avoidance by ensuring that information is exchanged between countries regarding international revenues, profits and taxes paid by jurisdiction (European Commission, 2016). The USA Treasury Department has also adopted CbCR and released new rules that also require multinationals to report profits and taxes paid on a CbC basis (PWC, 2016).

Australia is currently one of 65 countries to sign a multilateral agreement facilitating the exchange of CbC reports (PWC, 2017). Regarding CbCR, the Australian Taxation Office has issued more guidance that takes effect for companies with financial years commencing on or after the first of January 2016. The statements contained in these reports should have information regarding an entity's international operations, as well as taxes paid to the Australian Taxation Office by jurisdiction (ATO, 2017). On the 23rd of December 2016, South Africa issued regulations implementing CbCR standards for multinational enterprises (MNEs). The first CbCR must be filed by 31st December 2017 (PWC, 2017). If the MNE is a tax resident in SA and has a consolidated revenue of more than R10 billion, the ultimate parent entity of the MNE group, it is obliged to file the annual CbC report with SARS in SA. In all other cases, the SA tax resident is only required to notify SARS about the identity of the reporting entity and the country in which the reporting entity is a resident (PWC, 2016). Taxpayers are required to disclose the following information in their financial statements (PWC, 2016):

- Revenue amount
- Profit(/loss) before tax
- Income taxes paid
- Accumulated earnings

- Number of employees
- Tangible assets excluding cash and cash equivalents.

2.4.6 Other Initiatives

The automatic exchange of information is aimed at reducing tax evasion and promoting voluntary compliance (OECD, 2017). Tax authorities exchange information to ensure that entities pay the correct amount of tax. The report of entity tax information in Australia contains information taken from tax returns regarding public and foreign corporate tax results. The rules apply regardless of the size of the Australian operations. However, taxpayers can apply in writing to the ATO for an exemption. The ATO requires the information to ensure that companies with large profits pay equally high taxes because they are reaping profits from the community in which they operate. (PWC, 2017).

The UK government made an announcement regarding new legislation requiring large corporates to make public disclosures of their tax strategy, specifically regarding their business in the UK (UK, 2016). The Financial Reporting Council also announced that there would be a thematic review of tax disclosures made by selected companies, with a specific focus on reconciling the statutory tax rate to the effective tax rate, as well as disclosures around uncertain tax positions (Financial Reporting Council, 2016).

The OECD guidelines on Corporate Governance of State-Owned Enterprises (SOE) is there to ensure that SOE's are as transparent as private companies are and are accountable to the public (Heo, 2018). The guidelines emphasize the availability of financial and non-financial information (Heo, 2018).

The Global Forum on Transparency and exchange of information for tax purpose's objective is to ensure that the potential for tax transparency and exchange of information for Africa by Africans can improve the tax transparency to better tackle tax evasion (Jones, 2021). Tax transparency in Africa showed significant improvement in the following areas being raising political awareness and commitment in Africa and developing capacities in African countries with regards to tax transparency and the exchange of information (Jones, 2021).

The tax transparency reporting initiatives referred to above focus either on CbCR or an additional requirement for companies in specific industries. Furthermore these tax reporting requirements refer mainly to taxes on profits and to other taxes which include royalties and licenses, borne by the company.

3 Methodology

This study employed a desk review to investigate the role of tax transparency reporting in corporate governance and CSR. A desk review, as defined by Travis (2016), is secondary research that summarizes and collates previously collected data.

Because there may be a huge amount of information available for a given topic, this strategy entails gathering valuable information in a systematic manner (Aaron, 2008). As a result, we chose key phrases from the project scope and theoretical framework for this study, searched for various relevant sources, and chose necessary details that ideally equipped the paper's scope (Juneja, 2018). Tax transparency, voluntary disclosure and corporate governance, and CSR were some of the key terms used in the search. Peer-reviewed studies published during the past thirty years, media stories, reports on CG and CSR discussing tax transparency were among the literature sources we used.

4 Discussion and Conclusion

The study investigated whether corporate governance and CSR are motivating companies to disclose their tax affairs voluntarily in their annual financial reports. By exploring the four theories being legitimacy theory, agency theory, stakeholder theory as well as the institutional theory it is evident that voluntary tax transparency will only occur if there is buy in by society at large as well as stakeholders and if it is ultimately beneficial to shareholders.

King IV indicates that those in charge of governance have a responsibility to ensure that transparent tax policies are implemented. As a result, the publics belief is that good governance equates to more voluntary disclosure of information. Companies with good CSR disclosures are expected to be less tax aggressive. However, the act of paying taxes outweighs other additional tax disclosures in contributing towards CSR efforts. It is evident from the various initiatives explored in this study that tax transparency disclosures are a worldwide movement. The purpose of all these initiatives is to make tax information public as well as to ensure that companies pay their fair share of taxes. EITI's aim is to improve the transparency of payments made to government all over the world. One thing that is clear from the Dodd-Frank Act is that it has transformed the landscape in which the banking and financial services industry operates and enhanced transparency regarding cash and other assets for the greater good of society.

A content analysis for tax disclosures in financial statements, corporate governance and CSR reporting was not performed but limited to a review of the literature. Future research could incorporate an analysis of corporate governance and corporate social reporting disclosures in terms of King IV from financial statements to perform a more detailed statistical analysis. Furthermore, specific disclosure about tax affairs that will satisfy the needs of stakeholders concerning corporate governance and corporate social reporting can be identified. This suggestion follows from the EU Capital Directive (CRD IV) that states that increased tax transparency regarding profits made, taxes paid, and subsidies received is essential for regaining the trust of the financial sector in the EU (2014).

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The Role of the Peer Mentorship Programme in Enabling Students to Be Resilient During and Post the Covid-19 Pandemic

Lethiwe Nzama

Abstract First-Year students often struggle to transition from high school to higher education institutions (HEI), mainly due to the disadvantaged background from which they originate. However, the Covid-19 Pandemic was an additional challenge for first-year students in 2020 to 2022, as students had to transition to the new environment and cope with the pandemic simultaneously. HEIs had different strategies to ensure that students were supported, and one of the interventions was a peer mentorship programme. Against this background, this study explored the role and impact of this peer mentorship programme on students, both mentors and mentees, during and post the Covid-19 Pandemic. The study investigated whether the programme empowered students to be resilient during the 2020 to 2022 academic years. The study surveyed 110 students from a faculty in an HEI in South Africa. Data was collected using a questionnaire to explore the resilience of the HEI student and the influence of the peer mentorship programme on student resilience. The questionnaire was adapted from the Brief Resilience Scale (BRS) instrument. The study found that students who participated in the peer mentorship programme had an above-average BRS score and that the peer mentorship programme had a significant influence on the HEI students' resilience. Therefore, the study recommends that HEIs establish peer mentorship programmes to support students in developing resilience to assist them in better dealing with the challenges they confront as first-year students.

Keywords Covid-19 pandemic · Higher education institutions · Peer mentorship · Resilience · Brief resilience scale · Students

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1 Introduction

In March 2020, the COVID-19 Pandemic surged, disrupting people's lives and livelihoods globally (Maheshwari & Jutta, 2020; Meine et al., 2021; Mohamed et al., 2021; Nzama, 2022). people will respond by being psychologically distressed due to the pandemic (Silver, 2020; Coupland, 2021). Mental health issues became critical during the pandemic (Gunawan et al., 2020; Maheshwari & Jutta, 2020; Guillasper et al., 2021; Meine et al., 2021; Mohamed et al., 2021). In China, it was reported that young people between the ages of 18 and 30 were emotionally affected by the lockdown (Zhang & Ma, 2020). As such, the Covid-19 pandemic may result in psychological distress for students due to its disruptions in people's lives, especially the youth.

The Covid-19 pandemic resulted in considerable disruption in HEIs as studies had to be switched from face-to-face learning to online learning, which changed many people's lives, including HEI students (Guillasper et al., 2021; Konstantinov et al., 2021; Nzama, 2022). Most HEIs had to adapt and swiftly develop new strategies to ensure that teaching and learning continued with minimal interruptions. HEIs should be welcoming and caring institutions, creating a respectful and safe learning environment, embracing diversity, and fostering a sense of belonging (Coupland, 2021; Nzama, 2022). Brewer et al. (2019) posit that first-year students are the most vulnerable and should be assisted in developing resilience. Some HEIs use various support systems to assist students in transitioning from high school to university. In particular, peer mentorship programmes are used, which are usually run in the first semester. However, due to the Covid-19 Pandemic, these were extended to the second semester to ensure that the new university students were supported throughout the first year of their studies (Nzama, 2022). This action was to ensure that the HEI supports students to adjust constructively to challenges that may have been brought on by the Pandemic (Coupland, 2021). Coupland (2021) indicates that mentorship may be used for connection purposes, especially for students who felt lonely during the Pandemic and the ensuing lockdown.

Many researchers investigated various psychological aspects and the influence of the Covid-19 Pandemic on students. Literature indicates that for a correct analysis of resilience, it would need to be measured using empirical studies. Resilience is essential and relevant when addressing the impact of the Covid-19 Pandemic and any other crisis, as all countries have vulnerable communities (Godoi & Santos, 2021). Previous empirical studies around student resilience during the Covid-19 Pandemic were primarily conducted in other countries, such as India (Maheshwari & Jutta, 2020), Australia (Brewer et al., 2019), Indonesia (Asiyah et al., 2020; Yustika & Widyasari, 2021), Malaysia (Meine et al., 2021), China (Cai & Jin, 2021; Guan et al., 2022), the USA (Was & Greve, 2021), the Philippines (Guillasper et al., 2021), Palestine (Mahamid, 2020), Russia (Konstantinov et al., 2021), Brazil (Godoi & Santos, 2021), Germany (Meine et al., 2021) and Poland (Meine et al., 2021; Hoferichter & Steinberg, 2022). However, those studies focused mainly on the health and science disciplines (Asiyah et al., 2020; Guillasper et al., 2021;

Konstantinov et al., 2021) and the educational disciplines (Sonar, 2020; Hoferichter & Steinberg, 2022) and none focused on Business and Economics disciplines.

Coupland (2021) conducted a study to identify the role of instructional leadership and student mentorship in supporting students affected by a global pandemic. However, the study was not empirical but a literature review. The study was limited to the Canadian context and rural schools. It did not cover much content on resilience. However, it indicates that peer mentorship positively affects student academic performance, well-being, and overall positivity and recommends that school leaders embrace mentorship as a tool to improve students' mental health (Coupland, 2021).

Guillasper et al. (2021) conducted a study in the Philippines that analysed a relationship between resilience and the quality of life during this Pandemic. The study was limited to the Philippines' nursing students. However, Guillasper et al. (2021) analysed the relationship between resilience and the quality of life during the Pandemic. Maheshwari and Jutta (2020) analysed the relationship between optimism and resilience using two scales and consequently found a positive relationship between optimism, pessimism, and the Brief Resilient Scale (BRS). Their study further indicated that to increase resilience amongst students, there should be an increase in positive and optimistic thoughts (Maheshwari & Jutta, 2020). Konstantinov et al. (2021) conducted a study to analyse the effect of Covid-19 on Russian medical, psychology and social work students' well-being, substance use, and resilience. Their study found that male and non-religious students were more resilient than female students (Konstantinov et al., 2021).

Mahamid (2020) analysed the relationship between social skills, resilience, and grief among Palestinian students throughout the Covid-19 Pandemic. Their study found a negative relationship between grief and social skills and a positive relationship between social skills and resilience (Mahamid, 2020). Mahamid (2020:3) recommends that "HEIs should develop interventions that will re-enforce social skills which may improve psychological resilience amongst students during pandemics." Similarly, Sonar (2020) postulates that HEIs should develop student resilience to empower them to face challenges and look at adversities positively. Thus, a peer mentorship programme for pandemic intervention might fit this recommendation. A similar study to Mahamid (2020) was conducted in Indonesia by Asiyah et al. (2020), who analysed a relationship between resilience and social support for students in the Faculty of Psychology and Health. Their study found that social support may have increased student resilience during the Covid-19 Pandemic. As such, peer mentorship forms part of social support for students in the HEI, and it would be interesting to investigate whether students who were and are still involved in the peer mentorship programme are resilient and to what extent. Similar findings were reported by Cai and Jin (2021) and Mohamed et al. (2021), who hypothesize that social support is one of the coping strategies that should be used to improve students' well-being. Thus, available literature has limitations as the impact of peer mentorship in developing resilience is rarely researched, justifying the need for this study.

2 Research Purpose and Objectives

This study explores the peer mentorship programme's role and impact on mentors and mentees during and after the Covid-19 Pandemic. The secondary objectives of the study are:

- To determine if the peer mentorship programme empowered students to be resilient during and after the Covid-19 Pandemic; and
- To determine whether peer mentorship influenced students' resilience during and post the Covid-19 Pandemic.

The study will answer the following research question from the main secondary objectives above.

- To what extent did the peer mentorship programme assist in developing student resilience during and post Covid-19 pandemic?

3 Theoretical Framework

The Resilience Theory is a collective resilience concept developed by scholars, including Norman Garmezy (Masten & Tellegen, 2012). The roots of resilience research may be traced back to when psychologists studied the outcomes of children who were at a high risk of developing psychopathology (Masten & Tellegen, 2012). Contrary to common opinion, resilience is not a personality attribute but rather a dynamic process or system for successfully adapting to life's risks and adversity (Southwick et al., 2014).

From a strength-focused perspective, the Resilience Theory is the foundation for explaining how certain people may bounce back after suffering adversity (Masten & Obradović, 2007). The Resilience Theory is a change in basic assumptions that explains how these protective qualities help youngsters overcome the negative consequences of risk exposure (Fraser et al., 1999; Fergus & Zimmerman, 2005).

Initially, resilience research concentrated on personality qualities as elements responsible for favourable results, with the notion that resilience was based on an individual's qualifications and a static attribute. As resilience research advanced, it was determined that resilience is the ability of individuals to adjust to disruptions that threaten their function and growth. As a result, resilience is considered a dynamic rather than a static process (Masten, 2013; Sonar, 2020). Early resilience researchers sometimes referred to children who displayed resilient adaptation as invulnerable or invincible, as though only a select few could overcome challenging circumstances. Later, researchers discovered resilience was prevalent in human development when basic adaptation mechanisms were safeguarded and in excellent functioning condition (Bonanno, 2004; Sonar, 2020).

Individual, family, and community protective factors have been discovered to safeguard adaptation systems. The community in the HEI through the peer mentorship programme and the experience it provides is the protective factor in this study. Thus, in conjunction with the aim of this study, the role of a peer mentorship programme as a community protective factor was investigated to evaluate the impact it has on building mentors' and mentees' resilience in HEI. As such, the Resilience Theory was adopted in this study.

4 Literature Review

For more than two years globally, people have faced several hardships and uncertainties due to the Covid-19 Pandemic, especially during the first few months of 2020 when the Covid-19 Pandemic was at its peak. Significant adjustments and measures were implemented to protect and save people's lives. Some of these measures included social distancing and introducing 'the work-from-home concept' (Mahamid, 2020; Yustika & Widyasari, 2021). For HEI students, this meant studying from home as well, as most HEIs had to move from face-to-face teaching and learning methods to online (Asiyah et al., 2020; Mahamid, 2020; Was & Greve, 2021; Meine et al., 2021; Yustika & Widyasari, 2021; Guan et al., 2022). As such, social distancing affected everyone. Everyone, students included, was in lockdown to ensure the minimal spreading of the coronavirus through contact. This time that people stayed home was challenging (Asiyah et al., 2020; Mahamid, 2020; Yustika & Widyasari, 2021). As people are social beings, "social distancing" poses a problem for everyone (Asiyah et al., 2020; Maheshwari & Jutta, 2020; Yustika & Widyasari, 2021). Stress, worry, fear, wrath, sadness, and other mental health issues arose due to these trying circumstances (Asiyah et al., 2020; Maheshwari & Jutta, 2020; Mahamid, 2020; Cai & Jin, 2021; Konstantinov et al., 2021; Meine et al., 2021; Mohamed et al., 2021; Yustika & Widyasari, 2021; Hoferichter & Steinberg, 2022). This uncertain situation, which the entire world's population was attempting to adjust to—the new normal—also assessed the university students' resilience (Maheshwari & Jutta, 2020). Similarly, Mahamid (2020) claims that to address psychological challenges, such as stress, depression, anxiety and symptoms of post-traumatic stress disorder and grief, essential factors, such as resilience and social skills, may assist in addressing those psychological issues.

To address some of the challenges caused by the Pandemic's lockdown measures, such as social distancing and online teaching, the peer mentorship programme in the HEI was extended to support the students, both mentors and mentees.

4.1 Peer Mentorship

Lockdown during the Covid-19 Pandemic resulted in isolation for everyone, including students in HEIs. Literature indicates that this isolation resulted in some form of mental health concerns that may have affected students (Asiyah et al., 2020;

Coupland, 2021; Meine et al., 2021; Mohamed et al., 2021; Hoferichter & Steinberg, 2022). Coupland (2021) investigated different forms of student mentorship programs that may be used to address mental health issues that may have occurred due to Covid-19. For peer mentorship to be successful, its purpose must be focused on and indicated to those who intend to participate, as the literature indicates that structured peer mentorship programmes provide more academic support (Bruce & Bridgeland, 2014; Coupland, 2021).

Mentoring is a normal aspect of everyday life and can occur between youngsters and adults or among peers (Smith, 2017; Coupland, 2021). There are different forms of peer mentorship, namely Cross-Age Mentorship, Adult–Youth Mentorship, Community-Based Mentorship Programmes and many more (Coupland, 2021). In the study context, peer mentorship used in the HEI relates to the one between youngsters and peers in the same age group and is community-based. For example, the HEI peer mentorship is community-based, as it consists of a community in the faculty within the HEI based in South Africa, and only community members of these faculty can participate in the programme. The HEI peer mentorship programme has characteristics of the adult-youth mentorship programmes, as the programme coordinators influence the programme's running and sometimes function as mentors for the peer mentors. Lastly, cross-age peer mentorship occurs between second and third-year students who function as mentors to their first-year mentees. Literature indicates that most students who participate in peer mentorship experience an improvement in their academic journey, such as above-average grades, and highly value their relationships with their peers, mentors and other mentees (Weiss et al., 2019; Coupland, 2021). Mentorship is a powerful approach to encouraging young people by teaching them skills, listening to their perspectives, and fostering a sense of belonging (Coupland, 2021).

Although peer mentorship is primarily meant to benefit the mentee, it also benefits the mentor (Nabors et al., 2019; Coyne-Foresi & Nowicki, 2021). Some benefits include improved academic performance, positive behaviour, and positive and healthy psychological and social outcomes (DeWit et al., 2017). Being part of peer mentorship programmes may reduce negative risk behaviors, such as substance abuse (Douglas et al., 2018; Coupland, 2021) and increase positive behaviors (Bruce & Bridgeland, 2014; Coupland, 2021).

Literature indicates that peer mentorship is an effective intervention strategy for promoting positive youth development (Haddock et al., 2020; Coupland, 2021). According to Karcher (2005), a peer mentoring programme should focus on youth development by building a tight relationship between the mentor and mentee. Karcher (2005) says that the mentee should be given empathy, appreciation, and attention from the mentor. According to Karcher (2005), there should be distinctions between the roles of mentor and tutor, as it is often possible for mentees to expect their mentors to play the role of tutor, which should not be the case.

Coupland (2021) theorizes that a peer mentorship programme is beneficial for youth development and may assist the participants in resilience to their challenges. Similarly, Asiyah et al. (2020) also argue that social support is an essential factor that may be used to develop good resilience for individuals. Furthermore, Asiyah et al.

(2020) argue that individuals who participate in a group that offers social support are bound to have greater endurance in handling adversity.

4.2 Resilience

Interventions meant to optimize student engagement might have a minimal positive effect if they do not prioritise and address students' psychological needs (Saeki & Quirk, 2015; Coupland, 2021). The HEI may use different interventions, such as workshops (Hoferichter & Steinberg, 2022), resilience-building courses (Sonar, 2020), projects (Daniels et al., 2015; Delany et al., 2015), training (Kamath, 2015; Galante et al., 2016) and being part of peer mentorship programmes (Dyrbye et al., 2010; Hartley, 2010; Bamford et al., 2015). Moreover, resilience buffers problems brought on mental health problems as it results in coping skills and a positive mindset (Guillasper et al., 2021). Guillasper et al. (2021) further suggest that resilience may be used to recuperate and recover from stressful events. Moreover, Cai and Jin (2021) posit that psychological resilience is a critical component of coping with anxiety specifically related to the Covid-19 Pandemic.

Resilience is adapting to life-changing and challenging experiences (Maheshwari & Jutta, 2020). An optimistic view of life allows people to accept reality and life's problems. Resilience is commonly used to describe positive adaptation to adversity (Maheshwari & Jutta, 2020). Resilience is the learnable ability to recover or rebound from adversity, disagreement, failure, or even positive occurrences, progress, and more responsibility (Luthans, 2002; Brewer et al., 2019; Maheshwari & Jutta, 2020). Resilience is a dynamic process that includes constructive adaptation to adversity (Asiyah et al., 2020; Maheshwari & Jutta, 2020). Guillasper et al. (2021) define resilience as the ability to recover from adversity and cope with the difficulties and problems that come along with it.

Mahamid (2020) discusses that resilience may be a personal trait and a process. As such, resilience may depend on a person's character and ability to adapt and overcome adverse conditions and capacity to adapt successfully to a disturbance that threatens the system's function, viability, or development (Mahamid, 2020). Similarly, Asiyah et al. (2020) posit that resilience may be assessed from two points of view: focusing on the results side of the resilience or seeing it as a process. Asiyah et al. (2020) further indicate that if resilience is assessed as a process, there should be a focus on the efforts to get a good or bad outcome. For this study, the peer mentorship process is regarded as a tool to instill resilience, which will be assessed to note whether good or bad results affect the students.

According to the literature, resilience may be instilled via practice and coaching. (Masten, 2001; Masten & Reed, 2002; Bonanno, 2005; Maheshwari & Jutta, 2020). Relationships and the environment in which an individual lives significantly impact resilience. Individuals with resilience are better able to deal with stress. An individual process to develop resilience is a highly individual process, as people react differently to adversity. A solid support system, positive connections, a positive self-image, and a positive mindset are all required to develop resilience (Maheshwari & Jutta, 2020; Sonar, 2020).

Resilience has also been linked to successful ageing and has a good association with ageing (Lamond et al., 2008; Maheshwari & Jutta, 2020). Maheshwari and Jutta (2020) conducted a study in India to investigate the association between optimism and resilience during the Covid-19 period among HEI students in India. According to their findings, there is a favourable association between optimism and resilience. As such, since peer mentorship focuses on building hope, values, a positive mindset and many positive behaviors similar to optimism, it may be possible for resilience to be brought by a peer mentorship programme.

5 Design and Methods

The study used a questionnaire survey involving students from a Business and Economics Faculty at a public university in South Africa. The empirical study was conducted in May 2022 using peer mentorship for the 2020 to 2022 academic years. The research design was utilized, and data was gathered using two adopted instruments. The Brief Resilience Scale (BRS) instrument was adopted and included questions measuring the influence of the Peer Mentorship Programme on students during and after the Covid-19 pandemic.

As such, the researcher added open-ended questions to get reasons for the students' perspectives about the impact of the peer mentorship programme on their resilience during the Covid-19 Pandemic.

5.1 Participants

The questionnaires were sent to students who participated in the peer mentorship programme either as a peer mentor or peer mentee during the 2020 and 2022 cohorts. These include first to third-year students in the selected faculty of HEI in South Africa. The mentees are first-year students, while the mentors are second or third-year students. Thus, a purposeful sampling was used where the questionnaire was sent to all students who were part of the peer mentorship cohorts in the study period based (2020–2022) on the central database kept by the faculty. The questionnaires were sent to students via email. In an email and the first section of the questionnaire, students were informed that their participation was totally voluntary and that they would remain anonymous in the study, as neither their student numbers nor names were collected and that their responses would be confidential and would only be used for research purposes and to improve the peer mentorship programme. The questionnaire was administered through Google Forms and included a consent form that needed to be completed by the students before filling in the questionnaire.

This study has received ethical approval; the ethical approval number is SAREC20220414/04.

5.2 Procedure

The study explored the effect of peer mentorship in developing the students' resilience. The Brief Resilience Scale (BRS) was administered to 110 faculty students in an HEI who participated in the Peer Mentorship Programme between 2020 and 2022. The questionnaire asked students to choose one of the five options per statement that best represented their experience and opinions. Descriptions were used to summarize participants' demographics. The statistical data analysis was done using Microsoft Excel and the SPPS System. The researcher initially input the data into MS Excel and later transferred it into SPSS for Windows, where the appropriate analyses were conducted.

5.3 Tools (Measures)

The study used the adapted questionnaire from the Brief Resilience Scale instrument (Smith et al., 2008). Most of the existing studies that assessed the impact of Covid-19 on students' health and resilience used the same questionnaire as an instrument to collect data (Asiyah et al., 2020; Konstantinov et al., 2021; Yustika & Widyasari, 2021; Hoferichter & Steinberg, 2022). As such, this study also used the questionnaire to evaluate the effect of peer mentorship programmes on students' resilience.

5.4 The Brief Resilience Scale (BRS)

Smith et al. (2008) created the Brief Resilience Scale (BRS) to measure people's capacity to bounce back and recover from stressful situations. The BRS is considered a more reliable instrument for research on Covid-19-related mental health and psycho-emotional well-being and resistance (Konstantinov et al., 2021). The BRS has six items: items 1, 3, and 5 being positive statements and items 2, 4, and 6 being negative comments. All six items are graded on a 5-point scale ranging from strongly disagree to strongly agree. The scale is administered using the following instructions: "Please mark your level of agreement with each of the following statements using the following scale: one (1) means strongly disagree, two (2) means disagree, three (3) means neutral, four (4) means agree, and five (5) means strongly agree". Positive items were evaluated as follows: one (1) = strongly disagree, two (2) = disagree, three (3) = neutral, four (4) = agree, five (5) = strongly agree, while negative items were scored as follows: five (5) = strongly disagree, four (4) = disagree, three (3) = neutral, two (2) = agree, one (1) = strongly agree. Maheshwari and Jutta (2020) consider that since the total score of the BRS should be between six (6) and 30, when the BRS has a high score closer to 30, it indicates a high resilience.

5.5 *Statical Analysis*

The study result was collected from Google Forms, downloaded to a Microsoft Excel Spreadsheet, and transferred to SPPS Version.

Presented in Table 1 are the demographics and descriptive data of the study's independent variables. Of the 128 responses received, 110 were valid and used for data analysis to address the research objective and question. The majority of respondents were females (67,3%), aged group 21–25 years (53,6%), and mentees (65,5%) were the most participants compared to mentors (34,5%).

Table 2 shows the Brief Resilient Scale, with a composite score of 3.61 (SD = 1.14). The mean for each question included in the BRS was above 3, with a total score of 21,65 out of 30, considered a high score indicating high resilience (Smith et al., 2008; Maheshwari & Jutta, 2020).

Table 1 Demographics and descriptive data of independent variables (n = 110)

		Frequency	Percent
Gender	Female	74	67,3
	Male	36	32,7
Age Group	18–20	48	43,6
	21–25	59	53,6
	over 25	3	2,7
Role	Mentee–2020	18	16,4
	Mentee–2021	18	16,4
	Mentee–2022	36	32,7
	Mentor–2020	6	5,5
	Mentor–2021	8	7,3
	Mentor–2022	24	21,8

Table 2 Descriptive Statistics for BRS

	Mean	Std. Deviation
1. I tend to bounce back quickly after hard times.	3,95	0,98
2. It does not take me long to recover from a stressful event.	3,77	1,14
3. I usually come through difficult times with little trouble.	3,37	1,13
4. I have a hard time making it through stressful events	3,42	1,22
5. It is hard for me to snap back when something bad happens.	3,54	1,22
6. I tend to take a long time to get over setbacks in my life.	3,60	1,14
The Brief Resilience Scale Total	3,61	1,14

Table 3 The influence of peer mentorship programme on students resilience

	To a large extent	To a lesser extent	Not at all	N/A	Total	Relevant Total
Influence—Mentorship During Covid—Resilience	39	19	7	45	110	65
%	60%	29%	11%			
Influence—Mentorship Post Covid—Resilience	43	30	12	25	110	85
%	51%	35%	14%			

To ensure that students understood what resilience was, the researcher defined resilience on the questionnaire. To confirm the noted resilience in Table 2, the researcher added two more questions to the questionnaire to confirm with participants whether the Peer Mentorship Programme influenced student resilience.

Table 3 indicates results from students about the influence the Peer Mentorship Programme had on students' resilience. Table 3 indicates that the Peer Mentorship Programme significantly impacted student resilience, as most students who participated in the study indicated that the Peer Mentorship Programme influenced their resilience to a considerable extent both during and post Covid-19 Pandemic. Some students' responses were irrelevant to each question as they were only part of the programme either during or post Covid-19 Pandemic. Hence, their responses were regarded as not applicable to a specific question.

6 Discussion

The study explored the role and impact of a Peer Mentorship Programme as one of the critical support systems for first-year students during and after the Covid-19 Pandemic. The study explored whether the programme empowered students to be resilient. The study found that students who participated in the Peer Mentorship Programme had a high BRS composite score of 3.61 and were resilient during and post Covid-19. Thus, the high score indicates that mentors and mentees were resilient enough to adapt to adversity and handle the pressure caused by Covid-19 (Asiyah et al., 2020; Maheshwari & Jutta, 2020). These are similar findings to Maheshwari and Jutta (2020), who found that university students in India were resilient irrespective of living in these unprecedented times due to optimism, values, cultural impact and hope.

The study also found that the Peer Mentorship Programme creates resilience, as most students indicated it significantly influenced their reliance. This result corresponds to the suggestions made by Guillasper et al. (2021), who suggest that students may be trained to harness these resilient traits. As such, the results indicate that the Peer Mentorship Programme trained mentors and mentees to be resilient. The study results also confirm that resilience is an adaptation process (Guillasper et al., 2021). Through participation in the functioning and well-structured Peer Mentorship Programme, students are trained, developed, and empowered to have essential adaption of traits, skills and abilities that will empower them and prepare them for any challenges in life and their future careers (Bonanno, 2004; Sonar, 2020; Guillasper et al., 2021). Furthermore, the study confirms that peer mentorship is an effective intervention strategy for promoting positive youth development (Haddock et al., 2020; Coupland, 2021). The effectiveness of peer mentorship in the HEI can be justified by its significant impact on students' resilience and the fact that the students had a high BRS score.

7 Conclusion

In conclusion, the study indicates the importance of the role of the Peer Mentorship Programme in enabling HEI students to be resilient during the Covid-19 Pandemic. The results indicate that the Peer Mentorship Programme significantly influences students' resilience and that students who participated in the Peer Mentorship Programme had high resilience based on the BRS score. As such, the Peer Mentorship Programme positively affected HEI students during and after the Covid-19 Pandemic. The focus of the impact of the Peer Mentorship Programme was not only limited to the students who were mentored (mentees) but also included the mentors themselves. The current study has limitations as it focused on students in one faculty within the HEI and was limited to one HEI in South Africa. Despite all these limitations, the research reveals the significance and the need for well-functioning peer mentorship programmes in HEIs to enable students to transition effectively from high school to university and to develop students' reliance—be they mentors and mentees, who can then handle adversities and future life-threatening events such as pandemics.

Recommendation

The study results show that the peer mentorship programme has a positive effect on students as it assisted students in being resilient during Covid-19. Thus, it may be a valuable tool that HEI may use to empower students to be resilient during adversities. Thus, the study recommends that HEIs establish peer mentorship programmes to support students in developing resilience and ease of transition to deal with adversities.

Future Research

Since the study was limited to one faculty within a particular HEI, it may be extended to the whole HEI and other HEIs in the country and globally. Future studies may also be conducted on peer mentorship programmes between employees (academic or non-academic staff members within the HEI).

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Comparative Analysis of Moving Average and Bollinger Bands as an Investment Strategy in a Select Crypto Asset

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Abstract Investment in the crypto space requires careful consideration to ensure favourable returns. It, therefore, becomes imperative to employ an appropriate investment strategy that can accurately forecast the volatility of crypto assets to gain absolute returns on investment. This study investigates the efficiency of technical and analytical tools, Moving Average Envelop (MAE) and Bollinger Bands (BB), alongside the buy and hold trading strategy as the investment strategy on 718 daily data points of Nexo. Nexo is an automated centralized finance system, the next generation fintech model for modern microfinance service provision with crypto assets as collateral for instant loans. The result shows that MAE (10%) outperformed MAE (5% and 3%), BB and the buy-and-hold trading strategy. The crypto asset volatility examined (Nexo) could lead us to expect BB to outperform MAE, but this was not the case. This paper concludes that the MAE should be used over BB and the buy-and-hold trade strategy, especially where there is a clear trend and at higher percentages of the MAE. Hence based on the sample data MAE (10%) is recommended strategy for optimal returns.

Keywords Bitcoin · Blockchain · Bollinger bands · Crypto assets · Dapps · Moving average envelope · Nexo · Technical analysis

1 Introduction

Globally the financial sector has experienced a smooth but swift and growing drift from "in-bank" transaction processing to a digital world and a decentralized ledger system. This decentralized ledger system was introduced by the new emerging asset

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class, crypto assets, which offers digital currencies used for digital transactions while rendering irrelevant the need for trusted third-party intermediaries (Golosova, 2018; Nakamoto, 2008). It then becomes pertinent to unravel this new asset class's nature and market predictions to utilize all its possibilities.

The need for investors to understand the nature and behaviour of stock prices is vital for their investment decisions as this ultimately defines the success factor of their investments. The ability to understand and interpret market behaviour is done using the two traditional approaches: fundamental analysis and technical analysis (Alexander, 1961; Brock et al., 1992). Besides the analytical trading strategy of the traditional approaches, some other trading strategies exist, such as market timing, buy and hold and filter rule. As expected, these trading strategies employ different methodologies to gain the best possible investment returns aimed at a similar goal. The anticipated returns depend on the choice of analytical tool and trading strategy used to analyze these crypto assets.

Fundamental analysis involves the study of a company's history to understand its objectives, financial position, growth prospects, profitability, and worth compared to share prices (Nti et al., 2020; Technical analysis v. fundamental analysis, 2023). This approach does not necessarily study the market to make investment decisions but studies the company's background while studying the indirect influence that certain factors, such as economic, political, force majeure, rumours, and expectations of society, have on the market. Technical analysis is the study of market movements through the study of statistical charts using price, volume and historical data to determine future price movements (Taylor & Allen, 1992). As Wong et al. (2003: 543) rightly put it, "Technical analysis involves searching for recurrent and predictable patterns in stock prices". It includes a number of forecasting techniques, such as computerized technical trading systems, chart analysis and cycle analysis (Park & Irwin, 2007).

Technical analysis assumes three logical pillars: firstly, that price accounts for everything, implying that such factors as economic, political or psychological are reflected in the current market price. Hence the study of price charts can help to arrive at a forecast without undermining the effects of these factors as they are already captured in the price charts. Secondly, there is a market trend to which price movement is subject. An early recognition and study of this trend helps to project dynamic performance. Lastly, that history always repeats itself (Achelis, 2001; Taylor & Allen, 1992). This final reasoning assumes that human psychology is unchanging and price patterns reflect demand and supply forces. The technical analyst uses two technical indicators to forecast future price movements or develop trading strategies. These technical indicators are categorized on the performance of their charts; they are trend followers and counter-trend indicators. In this study, the trend followers, moving average (MA) and Bollinger bands (BB) are used with the buy-and-hold strategy. The choice of using only trend followers in this study is largely because of the volatility of crypto assets.

The key difference between technical analysis and fundamental analysis is that the former produces a forecast by identifying trends in price movement that are a reflection of the nature of the market but never specifies the exact factor(s) of influence of its forecast. Fundamental analysis is somewhat complex, it studies these factors and phenomena as environmental, political, force majeure. These economic and other expectations could impact on the currency market. However, it does so differently depending on the influence factor, producing relatively different results that could be considered irrelevant or decisive. This difference gives technical analysis an edge, seeing that these factors considered by the fundamental analysis approach are well captured in the price charts and present a close estimate of the stock price's actual state in real time.

Some studies have applauded technical analysis for its efficiency in ensuring maximum return on investments as it can capture volatility that cannot easily be detected by a mere study of external factors, which is the focus of fundamental analysis (Brock et al., 1992; Vasiliou et al., 2008). The fundamental analysis approach is used first to determine the company's suitability for investment. It analyses its profile and financial history to determine its overall health before the technical analysis tool is used to determine its possible investment returns. The wisest strategy is to use the fundamental and value investment strategy to pick the company for long-term holding and then use technical analysis for a short- to medium-term trading strategy. The volatile nature of crypto assets makes technical analysis the most appropriate investment strategy for the best possible investment returns.

The volatility of crypto assets exposes them to extreme market conditions of excessively bearish and bullish randomized phases. The best possible returns can be guaranteed only when an appropriate investment strategy is applied. However, there needs to be more empirical research on the nature and magnitude of potential returns across the new asset class. The opacity of such information could hinder traders, investors, and policymakers in deciding on an investment strategy option.

This study seeks to unravel the following questions: (1) what is the most profitable investment strategy for forecasting price movements of crypto assets between moving average, Bollinger bands, and buy and hold trading strategies? (2) why is the choice of MA and BB as the investment strategy for the select crypto assets used for this study? Insight into the profitability of these three trading strategies on crypto assets while comparing the efficiency of each trading strategy could provide investors and policymakers in the crypto asset space with guidelines for investment strategy options.

2 Overview of the Blockchain Technology and Crypto Assets

Blockchain technology is a distributed ledger of trustworthy digital records comprising a network of participants who can share information and financial transactions across the Internet without financial intermediaries (Hussein et al., 2018). Authors such as Bashar et al. (2019) and Makridakis et al. (2018) claim that with the passing of time, technology tends to offer the possibility of rewriting the model in most industries, proffer solutions that can fix awkward societal challenges such as control of confidential data, cyber security, and privacy. Blockchain technology promises a decentralized digital currency to bridge the gap between finance and technology (Krueckeberg & Scholz, 2018). Digital transactions in the blockchain are built on cryptographic proof, which is impossible to reverse, providing security to its P2P network of participants (Nakamoto, 2008).

One of the many qualities blockchain technology offers, besides security and trust, is the ability to prevent double-spending the peer-to-peer (P2P) network Participant. Double spending in blockchain technology occurs when a coin owner issues the same coin for multiple payment purposes. This problem of double spending is resolved by the miner, a trusted central authority (Hellani et al., 2018). The miner's work is akin to an auditor's in financial matters and financial institutions. In the blockchain community, they provide security, verify previous Bitcoin transactions and serve as a backbone in the network, making double spending impossible (Abreu et al., 2018). The absence of miners in the network would make it a dysfunctional system and expose the blockchain to attackers. The following subsections will discuss the blockchain series, the Decentralized applications (Dapps) and the instant crypto loan function of the Nexo and how it has helped revolutionize the crypto community.

2.1 Blockchain 1.0: Bitcoin

The first blockchain series, Blockchain 1.0, introduced the efficacy of value transfer with Bitcoin as its currency. Bitcoin relies on cryptographic validation of transactions and cryptographic public-private key to spend and store money (Böhme et al., 2015). Its selling point was the invariability of the distributed ledger technology, wallet protection, P2P network, privacy and a consensus reach in the P2P network for transaction validation (Hellani et al., 2018). Its disadvantages are high volatility, limited global acceptance, lack of buyer protection, high cost of transactions and the possibility of losing assets with a lost wallet. It was on these disadvantages that Blockchain 2.0 built its strengths.

2.2 Blockchain 2.0: Ethereum

Blockchain 2.0 is built on Ethereum, first introduced in a white paper by Buterin (2009). Ethereum may be viewed as an arbitrary state machine that is transaction-based with a programming language which can be used to make contracts (Buterin, 2009; Wood, 2017). The smart contract is an agreement for implementing a virtual or practical computer in a distributed and open manner (Hirai, 2017). The main innovation in Blockchain 2.0 is the smart contract, in addition to its improved speed and value transfer from Blockchain 1.0. “Smart contracts are digital contracts allowing terms contingent on the decentralized consensus that is tamper-proof and typically self-enforcing through automated execution” (Cong & He, 2019). They are a collection of data and codes, sometimes called state and function, deployed on the blockchain network using cryptographically signed transactions. They provide a distributed trustworthy computation (proof of work) as against the distributed trustworthy storage of Bitcoin, making it impossible to modify contract terms, thereby wholly eliminating trusted intermediaries (Makridakis et al., 2018). It does this by developing predetermined programs and rules between suppliers and clients to ensure secure service delivery at a much-reduced transaction cost compared to the Bitcoin transaction (Buterin, 2009; Kehrli, 2016). In addition, smart contracts can also be used to perform calculations and store information and transfer funds to other accounts automatically without necessarily having to perform the financial function itself (Yaga et al., 2018).

Some limitations of Ethereum include low transactions per second (TPS) even though its TPS outperforms that of Bitcoin. Secondly, Ethereum is still being developed. Hence there is uncertainty about the possibility of a successful transition from proof of work (PoW) to proof of state (PoS). Thirdly, this uncertainty questions the dependability of its token or other tokens built on it. Fourthly, since it depends on another blockchain, unpredicted issues might arise due to a “hard fork” (a hard fork is a change to a blockchain network protocol that works to validate or invalidate transactions in the blockchain (Kim & Zetlin-jones, 2019)). Lastly, although Ethereum is taking the lead in enterprise blockchain adoption, it competes with old blockchain protocols and new ones yet to be launched (Ackermann & Meier, 2018; Golosova, 2018).

2.3 Blockchain 3.0: Digital Society

Blockchain 3.0 offers a digitized society. It differs from the previous two versions with a massive array of applications not directly related to value transfer but to governance, education, health, agriculture, legal industry, eGovernment, art, public goods, NGOs, tax administration and a host of other industries (Dogo et al., 2018; Kuo et al., 2017; Manohar & Briggs, 2018; Rooksby, 2017). Blockchain 3.0 is built to solve real-life issues. The launch of Blockchain 3.0 was an attempt to resolve issues in the blockchain industry, such as interoperability, scalability, and privacy. Blockchain 3.0 addressed these problems with features to build its strength. In addition to these features, Blockchain 3.0 promises sustainability, smart cities, the Internet of Things (IoT), digital identity, big data technology and privacy (Ackermann & Meier, 2018; Efanov & Roschin, 2018; Pieroni et al., 2018). These gradual but steady improvements in the blockchain series gave rise to Dapps, a decentralized application and an improved intelligent contract version.

2.4 Dapps

Dapps, a decentralized application, is hosted by a P2P network, eliminating human interference, maintenance, and governance by the developers. The self-operating system of Dapps forms a Decentralized Autonomous Organization (DAO) (Cai et al., 2018; Pieroni et al., 2018). Decisions in the DAO are made by artificial intelligence without human interference, but the DAO has its own internal capital, and it can maintain itself. Dapps do not conform to legal bindings, and their protocol resides in a decentralized stack, an open-source network for building smart contracts (Raval, 2016). Dapps have four striking properties: firstly, they operate as an open source, allowing third-party code audits. Secondly, they can generate internal currency by trading scarce resources such as storage space, videos, ads, trades, images, and texts for an app coin. Thirdly they have a decentralized consensus, ensuring transparency of transactions. Lastly, they have no central point of operation; nodes are independent of each other hence the point of failure (Raval, 2016). The Dapps function further strengthens the use of blockchain cases, giving rise to the possibility of a trustworthy decentralized autonomous system applicable in all fields. The details of the instant loan function of Nexo and how it has transformed the crypto space will be discussed next.

2.5 Nexo

Nexo is the brainchild of Credissimo, a European FinTech company founded in 2007. It has been a market leader in online consumer lending in most European countries, with over ten years of experience in the field. Nexo houses over twenty cryptocurrencies, amongst which are Bitcoin and Ethereum, two of the most widely used crypto assets. In their service functions, Nexo can be compared to a micro-financial bank with a more advanced business model as they provide lending services worldwide while using cryptocurrencies as the collateral backing for loan access.

The Nexo business model offers the first crypto-backed instant loans to the world, enabling digital asset owners to trade their crypto assets as collateral for liquid cash loans rather than an outright sale, thereby resolving a critical inefficiency for the crypto assets world (Credissimo, 2018). This innovation further strengthens the crypto community by affording them a loan access option characterized by speed. Other characteristics include cost effectiveness, absence of hidden fees, no credit checks, flexible loans, and transparent transactions. Three benefits stand out for Nexo token holder's use and possession of the token; they receive dividends on the token, enjoy discounted interest rates on loans, and Nexo token can serve as collateral for loans (Credissimo, 2018; "What is NEXO?" 2023). Nexo financing offers three possible loan repayment options: cryptocurrency, Nexo tokens or fiat currency. To determine borrowers' loan-to-value (LTV), which signifies the risk measurement, Nexo uses the Nexo Oracle algorithm. The volatility and the present market value of the crypto assets highly impact a borrower's LTV.

In conclusion, the global technological space has enjoyed a gradual but progressive transformation from the impact of blockchain technology since its emergence in 2008. All variations of the blockchain technology series and the Dapps offer different but relevant features that could transform the world if applied to our everyday lives. Also, with the introduction of Nexo crypto-backed instant loans, more possibilities are available to the crypto communities. Nexo has been selected as one of the key industry players in terms of experience in microfinance and global footprint. This should increase more ownership and use of crypto assets.

3 Literature Review

3.1 Theoretical Literature

The practice of technical analysis dates to centuries ago but has, in the past decades, gained better acceptance and practice among crypto asset portfolio managers. As far back as the 1600s, the Japanese rice traders at Dojima Rice Exchange in Osaka studied patterns in rice prices to forecast future prices (Wong et al., 2003). In the late 1890s, Charles H. Dow and some market students devised the Dow Theory, which is said to be the father of technical analysis (Yadav, 2017). Since the evolution of the Dow Theory, countless theories have evolved in a bid to offer a deeper understanding of the study of stock price movements and how best to leverage them for optimum investment decisions. Some of these theories are Orthodox Theory, Confidence Theory, Random walk theory (RWT) and the Efficient Market Hypothesis (EMH). Orthodox Theory suggests that ancient stock price movement results from corporate earnings changes. Confidence Theory posits that the undulation in investors' credence in future dividends, stock price, and earnings directly impacts stock price movements. The RWT emphasizes the unpredicted and fluctuating nature of stock prices, while, over time, it resembles a random selection of numbers from a number pull or the result derived from coin tossing (Horne & Parker, 1967). The EMH suggests that an organized or efficient market is one that completely depicts all available information on trading prices and that a change in price owes largely to new information (Leung & Chong, 2003).

EMH proposes that it is impossible for a firm to earn excess returns by exploiting available information about the market, as the current stock prices already reflect such information (Fama, 1970). The EMH attempts to explain the reason for price changes in security markets and how these changes take place, providing investors and financial managers with the implications that this change effect has on the market. The application of technical analysis has been found to be irrelevant in an efficient market as the market is a reflection of past prices and all available information, implying that profit can hardly be made by the exploitation of such already available information (Leung & Chong, 2003; Taylor & Allen, 1992).

Some portfolio managers use the buy-and-hold strategy to achieve absolute investment returns. This strategy implies: buy assets, hold for a period, often for many years, and then sell. It is a form of retirement savings where portfolio managers invest in valuable stock and allow it time to grow. The buy-and-hold strategy holds in an efficient market, producing reasonable earnings of the market rate of return without engaging in any technical trading system (Sanderson & Lumpkin-Sowers, 2018). In a weakly efficient market scenario, where the current stock price is only a reflection of its own history, a study of this price history alone will not provide the best information for profit maximization and does not outperform the buy-and-hold trading strategy (Jensen & Benington, 1970). Tower and Gokcekus (2002) assert that there are better trade strategies for volatile stocks as crypto assets than the buy-and-hold strategy.

The market timing technique is employed to determine trade decisions of financial assets to forecast future price movements in the market. There is a claim, however, that returns produced by this technique do not surpass that produced by the buy-and-hold strategy (Wong et al., 2003). In another study, Shilling (1992) agrees that the buy-and-hold strategy outperforms market timing. He provides evidence from the Dow Jones Industrial Average (DJIA) that shows that an investment made in 1946–1991, post and pre-war era, saw a $1 investment rise to $116 during the period for portfolios fully invested. He noted that although the buy-and-hold strategy had a record-breaking result with the DJIA investment, stocks did not appreciate in a uniform, smooth fashion but burst. An investor engaging in the buy-and-hold strategy risks losing out at times of great spurts. With the use of technical analysis, however, this can be mitigated. The empirical literature provides evidence base facts on the impact of technical analysis as presented next.

3.2 Empirical Literature

Empirical findings on using technical analysis as an investment strategy to determine price movements in crypto assets have reported different results. However, there is still an empirical gap in this field. Some empirical findings report a positive impact, some negative, mixed, and a few neutral ones. There are several trading strategies; the earliest widely used strategy was the filtering rule (Park & Irwin, 2007), first introduced by Alexander (1961). Fama and Blume (1966) investigated using the filter rules on 30 individual securities between 1956–1962 in the DJIA. They concluded that if certain factors such as filter rules operating expenses, funds invested idle time, clearing house fees and specialist brokerage fees are considered, long transactions' excess profits might yield a negative result in practice compared to a buy-and-hold strategy.

Using the moving average, Cootner (1962) examined 45 stock samples from the New York Stock Exchange (NYSE), and his results suggested that commodity and stock prices moved in trends. The Horne and Parker (1967) and Jensen and Bennington (1970) studies on the stock market using the relative strength index and the moving average trading rules found them unprofitable. Fama and French (1988) examined the autocorrelations for increasing holding periods of stock returns for sample periods of 1926–1985. Their findings show that; indeed, stock returns are predictable. Jaffe and Mandelker (1976) and Nelson (1976) concurred with this and added that the predictable variations are often less than 3% of the return's variations but up to 25–45% for 3–5 years of stock return. They argued that the price component that shows a gradual but steady reduction is the reason for the long horizon returns strong predictability. A more recent study also collaborated the findings (Ma et al., 2021; Widjanarko, 2022; Chen et al., 2021; Nti et al., 2020).

Cutler et al. (1990) also concluded that returns are positively correlated at several months' horizons but negatively correlated at the 3–5-year horizon. Treynor and Ferguson (1985) found the two factors, past prices and non-price information, useful in profit maximization in the stock market. They posit that a combination of these two factors greatly enhances the attainment of unusual profit maximization. They add that while the opportunities for profit maximization are created by the non-price information, analysis of past prices helps to authenticate its efficient exploitation. Brock et al. (1992) used technical trading rules on a 90-year DJIA price history and found a positive and strongly consistent result on its forecasting power. Pruitt et al. (1992) and Pruitt and White (1988) noted that a combination of technical trading systems, CRISMA, was found to be profitable in the stock market. Pruitt et al. (1992) reported that the buy-and-hold trading system was outperformed by the CRISMA over the 1986–1990 period.

In a study conducted by Park and Irwin (2007), a conclusion based on earlier studies in this field support the efficiency of technical analysis as a trading tool in foreign exchange and futures markets rather than in stock markets. However, they note that modern studies until the early 1990s applaud technical analysis strategies for consistent economic profit generation. They also added that of 95 modern studies they reviewed, 56, 20 and 19 studies results found the technical trading strategy to be positive, negative, and mixed, respectively.

There have been some earlier empirical findings that have implied the demerit of technical analysis as a standardized measure for forecasting price movements (Fama & Blume, 1966; Jensen & Benington (1970); Pinches, 1970). The report presented by Curcio et al. (1997) and Lucke (2003) indicated insufficient evidence of the profitability of technical trading patterns in foreign exchange markets. They add that over time; the trading profit patterns showed a decline. Pinches (1970), however, suggested that there was biased research on the validity of the actual impact that the use of technical analysis has on forecasting stock price movements.

One can hardly tell at what point the practice of technical analysis became a necessity for portfolio managers, especially with crypto asset portfolio managers, but what is evident is that it has provided them with an arsenal that, if well utilized, assures them of absolute returns. The methodology section provides more light on the data analysis, technical indicators, and trading rules.

4 Research Methodology

Technical indicators are tools used by technical analysts for forecasting future price movements or to develop trading strategies. They are used to gain an understanding of market psychology and the security of demand and supply. There is a view that technical analyses is mostly used by academic researchers as they are expressed in mathematical formats, although recently, pattern recognition algorithms have been used to study visual chart patterns (Park & Irwin, 2007). However, even though it is a known fact that technical analysis involves the reading and interpretation of statistical charts, it can easily be learned by anyone and is not limited to mathematical scholars alone. Park and Irwin (2007) also noted that every system has rules by which it operates, including the technical trading system, as it embodies trading rules and signals that are either long or short depending on the value of the criteria being considered. However, moving averages (MAs), momentum oscillators and channels are the most popular trading systems (Gultom et al., 2023; Malaysia, 2021).

Technical indicators have been categorized into two different classes largely based on the performance of their charts: trend follower and counter-trend indicators. Trend followers are MAs and BBs, and counter-trend indicators are the relative strength index (RSI), Aroon indicator, average directional index (ADX), accumulation/distribution line, on-balance volume, stochastic oscillator and moving average convergence and divergence (MACD). For this research, the trend followers (MA and BB) technical indicators were used as the buy-and-hold trade strategy. BB is known to capture volatility the MA cannot. The BB width depends on price volatility around the mean. With increased volatility and at 2 standard deviations, 95% price movement is captured by BB (Leung & Chong, 2003). BB is at its best as an indicator for long periods, while technical analysis works best for short time periods (Leung & Chong, 2003).

The data used in this study were sourced from Nexo, with 718 daily data points from March 2018 to April 2020. The starting period is the first time NEXO token was launched in the market. The end period was the latest available data when the study was conducted. MA and BB channels are based on the Simple Moving Average (SMA). The three trade strategies were applied to the data set at a 10-day SMA: of a 3%, 5% and 10% Moving Average Envelop (MAE), the BB and the buy and hold.

We deployed MA at 3%, 5% and 10% as decision rules of buying and selling, respectively. We used the lower Bollinger Band as a buy strategy and the upper Bollinger Band as a sale strategy. The trading rule for the MA is such that signals are generated in relation to the proportion of the closing price to the MA; when the closing price is above the MA, a buy signal is generated, and when the reverse is the case, a sell signal is generated. However, Wong et al. (2003) emphasized that the MA trading rule only stands true in a situation where there is a clear trend; but false signals could be expected with excessive volatility. The MA trading rule is the same for all percentages of MAE. In this study, a 10-day SMA was used at 3%, 5% and 10% MAE.

$$\text{Buy if :} \qquad \text{Trade} = 1\ (\text{Nexo}\ [\_n\text{-}1] < \text{MAEL}\ [\_n\text{-}1]\&\text{Nexo} > \text{MAEL}) \tag{1}$$

$$\text{Sell if :} \qquad \text{Trade} = 2\ (\text{Nexo}\ [\_n\text{-}1] > \text{MAEU}\ [\_n\text{-}1]\&\text{Nexo} < \text{MAEU}) \tag{2}$$

Where

MAEL; moving average envelope lower

MAEU; moving average envelope upper

Trade = 1; buy signal

Trade = 2; sell signal

The trading rules for BB indicate a buy or sell signal by the ratio of the price to the band: buy if from below price crosses the lower band, and with the reverse, a sell signal is generated.

$$\text{Buy if :} \qquad \text{Tradeb} = 1\ (\text{Nexo}\ [\_n\text{-}1] < \text{BBL}[\_n\text{-}1]\&\text{Nexo} > \text{BBL}) \tag{3}$$

$$\text{Sell if :} \qquad \text{Tradeb} = 2(\text{Nexo}\ [\_n\text{-}1] > \text{BBU}[\_n\text{-}1]\&\text{Nexo} < \text{BBU}) \tag{4}$$

Where

BBL, Bollinger bands lower

BBU; Bollinger bands upper

Tradeb = 1; buy signal

Tradeb = 2; sell signal

The trading rule of the buy and hold strategy is simply to buy stocks or any asset, hold and sell later. An investor might decide to sell 50% of his stocks at some point and reinvest, but it goes on in a circle of buy, hold, then resell 100% or, say, 50% of the investment.

4.1 Limitations of the Research

Due to data limitations, this study could only cover the bear and consolidation phases immediately following the post-2016/2018 massive bull market in the crypto space. This focus could imply that the results might differ, given a longer study period and/or a different season in the market using the same analytical tools. In addition, it was observed that the BB outperformed MAE 3% and 5% but did not outperform the MAE 10%. Further research could investigate returns from using different days' SMA with the same technical and analytical tools.

5 Results and Discussion

Figure 5.1a–d depicts the price volatility trend and trade opportunities for each of the MAE used and the BB.

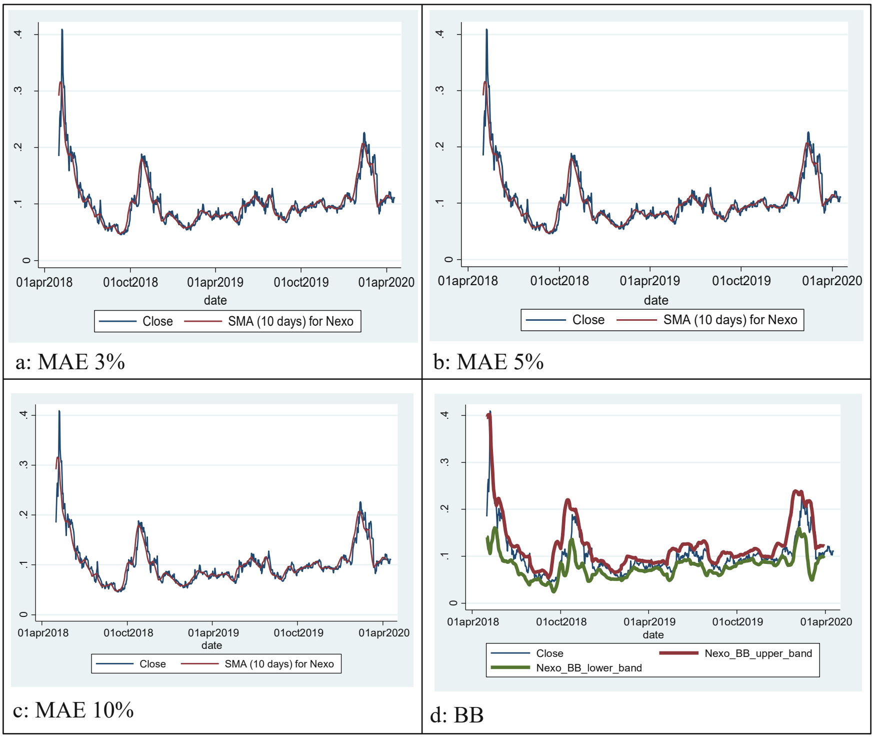

Fig. 5.1 (**a**–**d**) Price volatility trend of MAE 3%, 5% and 10% and the BB. Source: Authors compilation from technical tool application on data set

The fluctuations in Fig. 5.1a–d depict the volatility of the technical analytical tool. Table 5.1a–d represents the trade opportunity for MAE and BB, the buy and hold strategy is not tabulated as it only executed one each of both trade options. Of the trade opportunities available of BB and MAE 3%, 5% and 10%, each investment strategy utilized an equal trade option each of buy or sell signal of 8, 30, 27 and 19 days, respectively. This trade opportunity is irrespective of the actual trade opportunity available to each investment strategy as permitted by technical analysis trade rule of thumb. The rule is that if there is more than one of the same trade signals directly following each other, only one such trade signal is executed until an opposite trade signal is generated (Leung & Chong, 2003). This rule further shrinks the actual trade opportunities available for all the trade strategies, leaving room for a possible bias of trade, as anticipated returns for unexecuted trade are unknown. From observations of this study, executing immediately opposite signals resulted in a sharp drop in expected returns. Table 5.2 shows that though MAE 3% and 5% had the most trade opportunities, they performed the worst, as seen in the result of their terminal values.

It should be noted that the trade started with a USD1,000 equivalent of the Nexo Dollar for all trade strategy. The result shows that MAE 10% was the

Table 5.1 (a–d) Trade opportunities of MAE 3%, 5%, 10% and BB

Trade	Freq.	Percent	Cum.
(a) MAE 3%			
0	593	84.11	84.11
1	55	7.80	91.91
2	57	8.09	100.00
Total	705	100.00	
(b) MAE 5%			
0	609	84.82	84.82
1	52	7.24	92.06
2	57	7.94	100.00
Total	718	100.00	
(c) MAE 10%			
0	633	90.56	90.56
1	30	4.29	94.85
2	36	5.15	100.00
Total	699	100.00	
(d) BB			
0	677	94.29	94.29
1	16	2.23	96.52
2	25	3.48	100.00
Total	718	100.00	

Source: Authors compilation from technical tool application on data set

Table 5.2 Rate of return for MAE 3%, 5%, 10%, BB and the buy-and-hold trading strategy on 718 daily data points of Nexo

Trade strategies	Buy Opportunities	Sell opportunities	Terminal values
Buy and hold	1 (100%)	1 (100%)	106.819
BB	16 (2.23%)	25 (3.48%)	4493.03
MAE 3%	55 (7.80%)	57 (8.09%)	1404.25
MAE 5%	52 (7.24%)	57 (7.94%)	1993.56
MAE 10%	30 (4.29%)	36 (5.15%)	20,340.66

Source: Authors computation from technical tool application on data set

best-performing trading strategy yielding the highest terminal value, outperforming MAE 3%, MAE 5%, BB and the buy-and-hold strategy. The next best-performing technical tool was the BB, followed by MAE 5%, MAE 3%, and then the buy-and-hold trading strategy. Though BB outperformed MAE by 3% and 5%, the difference in terminal returns between BB and MAE by 10% is quite significant. It could be inferred that the trend became distorted with the lower percentages of MAE engaged. Hence MAE 3% and 5% could not outperform BB, whereas MAE 10% did.

The results of this study support the use of MAE over BB as an investment strategy for crypto assets, as supported by the values of the terminal returns for each investment strategy shown in Fig. 5.2. The buy-and-hold strategy did not stand a

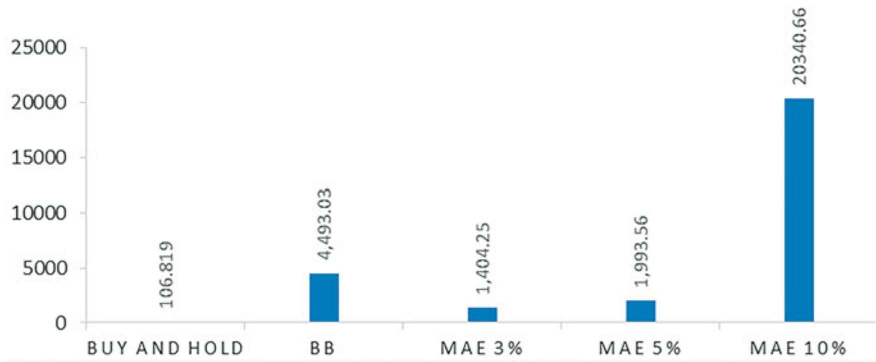

Fig. 5.2 A bar chart of terminal return values against the trading strategies

chance as a profitable investment strategy in the investigation. Theoretically speaking, one would expect BB to outperform MAE, as BB is noted to have unique features (the ability to capture relatively high volatility in price movements) that MAE does not have. This study finds that despite this unique attribute of BB, in practice, it did not outperform the MAE by 10%. The results of this study strongly support the use of MAE over BB as an investment strategy for crypto assets. This conclusion is also supported by the findings of Leung and Chong (2003).

6 Conclusions

This study analyzed the comparative profitability of Bollinger Bands and Moving Average as an investment strategy. We used empirical analysis to determine the most efficient technical tool between the moving average envelope and the Bollinger bands on a 718 daily data point of Nexo. The buy-and-hold trade strategy was used as a baseline strategy. Our results show that the MAE should be used over the BB and the buy-and-hold trade strategy. The MAE outperformed the other two strategies by a significant margin. The evidence from our findings answers the research questions on what the most profitable technical analysis tool between the MAE and BB is.

Due to data limitations, the study could only cover the bear and consolidation phase. Future studies should focus on other phases of investment periods, using data sets that represent extended time periods and other crypt assets other than the Nexo. Our results and conclusions from this study represent only one phase in the crypto asset phase of the market (that is, the bear market). Therefore, recommendations for future study would be to investigate using a data set that focuses on at least any of the three different phases in the crypt assets phases not covered by this study, i.e. the bull phases, the bull and consolidation phases, and the bear phases.

Based on our sample data, we conclude that the MAE should be used over BB and the buy-and-hold trade strategy, especially where there is a clear trend and at higher percentages of the MAE. Hence based on the sample data MAE (10%) is recommended strategy for optimal returns.

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IT Service Management Best Practices in Insurance Industries

Mvelase Nqobizizwe and Smith Rozanne

Abstract Information Technology Service Management (ITSM) is the set of processes and professional disciplines that are used to manage the design, planning, and service delivery within the Information Technology (IT) environment in an organisation. It is estimated that 80% of ITSM projects in the South African insurance industry are unable to meet their objectives due to organisations failing to fully embrace and implement the ITSM fundamentals holistically. Two South African insurance organisations listed on the Johannesburg Stock Exchange (JSE) whose responsibilities are within IT operations were part of the study. The study adopted a qualitative research methodology and data were collected using a questionnaire research instrument. The questionnaire was administered on the Monkey Survey online platform with the link sent to 230 employees and acquired 118 responses. The study noted that both organisations have implemented ITSM in driving perceived service delivery, while employees did not appear to acknowledge the underlying ITSM fundamentals. This finding implies that the organisation may be poorly controlling IT costs, that there is an absence of continual improvement, and the organisation may have ineffective IT capabilities. The present study provides a detailed evaluation of the popular and commonly used ITSM framework's implementational challenges within the South African insurance industry and highlights the significant misconception among the employees regarding ITSM fundamentals and principles as a means of service delivery improvement.

Keywords Information Technology Service Management · ITSM frameworks · The insurance industry · Information technology · Service delivery · Johannesburg Stock Exchange

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1 Introduction

According to Love and Ness (2016), Information Technology Service Management (ITSM) is a strategy or governance model used to manage multiple Information Technology (IT) activities in an organisation. Organisations receive IT-based services from ITSM, by coordinating IT activities with the needs of business processes. ITSM in turn assists the organisation with the achievement of their business goals (Deutscher & Felden, 2010). The definition of ITSM consists of many components, including ITSM fundamentals (Widianto & Subriadi, 2021), different ITSM values and practices (Rapanyane & Sethole, 2020), and different ITSM frameworks that can be implemented (Peebles, 2007).

The conceptualised version of ITSM came into effect in the early 1980s, intending to describe the strategic approach to design, deliver, manage and improve the way organisations use IT (Hamranová et al., 2020). Thereafter, ITSM advancement allowed all the discrete processes and activities in supporting effective service delivery (Berihun & Teferi, 2021). ITSM is described as the set of processes and professional disciplines that are used to manage the design, planning, and service delivery within the IT environment in an organisation (Cusick, 2020). The IT environment furnishes the platform where ITSM can support business operations in improving service delivery (Yazici et al., 2015). According to Berihun and Teferi (2021), ITSM and IT are core pillars in driving customer expectation satisfaction within the South African insurance industry. Widianto and Subriadi (2021) describe the key ITSM professional disciplines, as stated by Yazici et al. (2015) above, as the ITSM fundamentals that need to be considered in ITSM implementation. Nicolas et al. (2021) further support the statement by postulating that ITSM fundamentals define the core pillars that manage IT operations as a service in a tailored manner. According to Dwivedi et al. (2021), ITSM fundamentals are a broad topic in the strategic approach to service delivery. For this reason, one needs to know exactly what these ITSM fundamentals are.

According to Mora et al. (2020), the ITSM fundamentals include the alignment of IT teams to business priorities, enabling cross-department collaboration, promote continuous improvement, improve change management, improve customer-centricity, and focuses on end-to-end optimisation of service delivery.

As stated above, the definition of ITSM also includes the ITSM values and practices. These ITSM values and practices are the belief that IT should be delivered as a service to improve the organisation's bottom line revenue (Rapanyane & Sethole, 2020). IT service delivery further focuses on the quality of work being done and meeting customer expectations (Ilieva & Gaydarov, 2021).

Given the size of ITSM, ITSM implementation is achieved through ITSM frameworks that focus more on the ITSM fundamentals than the overall ITSM professional disciplines (Peebles, 2007). Dwivedi et al. (2021) define the ITSM framework as the collective processes and practices that are needed to manage and support IT services to enable effective communication and trust between customers and providers. According to Dávila et al. (2020), every organisation has a choice of which ITSM framework to use but they are guided by the organisation's goals and ITSM framework fundamentals.

This study will therefore focus on the ITSM fundamentals. There are several benefits associated with the implementation of ITSM fundamentals through ITSM frameworks in South African insurance organisations. These include the enablement of IT services that provide value to the business processes (Mora et al., 2020), the promotion of IT service delivery through interaction between customers and providers (Rapanyane & Sethole, 2020), and the prediction of IT costs and promoting continual improvement of IT capabilities and effectiveness (Serrano et al., 2021).

From the above highlighted benefits, ITSM has an influence on the success of an organisation as the entire IT service delivery is derived from ITSM implementation. It is therefore important for an organisation to be clear about what they want to achieve, and to select the correct ITSM framework in gaining the ITSM fundamental benefits.

According to Kinney (2020), a significant increase has been noted in which the insurance industry in South Africa is adopting ITSM as the IT service delivery methodology. South African insurance organisations listed on the Johannesburg Stock Exchange (JSE) have implemented ITSM fundamentals to remain relevant in the market space, despite their respective ITSM frameworks (Hermita et al., 2020).

For an organisation to employ the ITSM fundamentals effectively, one or a combination of the following common and popular frameworks needs to be adopted (Mora et al., 2020):

- Information Technology Infrastructure Library (ITIL): version-controlled to improve the framework (Version 1–Version 4).
- Control Objectives for Information Technologies (COBIT): version-controlled to improve the framework (Version 1–Version 5).
- Microsoft Operations Framework (MOF).
- Six Sigma.
- ISO 20000.
- The Open Group Architecture Framework (TOGAF).

1.1 Research Problem

Current studies have shown that IT within the South African insurance industry has become a core pillar in driving customer satisfaction (Microsoft, 2018). According to Mulders (2020:16), "many companies are not deploying best practice ITSM solutions based on Information Technology Infrastructure Library (ITIL), and this is concerning. The success of many enterprises is dependent on IT and coupled with the complexity of today's infrastructures. IT departments must also break the shackles of the past and find ways to ensure that they are no longer simply the IT helpdesk but a service to the business. ITSM is the antidote". As a result of this, the research problem addressed in this study is formulated as follows:

Implementational challenges in the adoption of ITSM frameworks that the South African insurance industry is faced with.

1.2 Research Objectives

The pursued research objectives of this study are as follows:

- To understand ITSM practices within the context of South Africa.
- To investigate which frameworks are being used within the South African insurance industry in implementing ITSM.
- To determine to what extent ITSM customers understand ITSM principles.
- To identify ITSM implementational challenges and areas for improvement.

2 Literature Review

2.1 History of ITSM

The conceptualised version of ITSM came into effect in the early 1980s, intending to describe the strategic approach to design, deliver, manage and improve the way business uses IT (Hamranová et al., 2020). ITSM fundamentals promote continued customer-centric improvement, and acknowledge all the IT discrete processes and activities in supporting comprehensive service delivery (Berihun & Teferi, 2021).

2.2 ITSM Definition

Zuev et al. (2018) describe ITSM as different professional disciplines and activities put together to manage IT operations. Lazic and Groth (2019) posit that ITSM can be conceptualised as the solution to the problem of aligning the correlation between the business and IT infrastructure domain to take advantage of IT opportunities and capabilities. Furthermore, Jiang and Cameron (2020) define ITSM as a multidisciplinary practice aimed to explore IT processes in a holistic custom.

ITSM covers the managerial aspects of IT business, including support, delivery, IT planning, security, infrastructure, and any other provisions to advance customer services (Verma, 2016). ITSM implementation further enables IT operations that promote organisations to render quality IT services that adhere to service level agreements (SLAs) and meet business needs (Sukmana et al., 2019). In addition, ITSM practices emphasise IT services in generating value for the customers, which can be applied in all organisations within an IT background (Lucio-Nieto & Gonzalez-Bañales, 2021).

ITSM consists of policies, structured processes, and supporting procedures that are performed by an organisation to design, plan, deliver, operate, and control IT services offered to customers (Aster, 2019). Serrano et al. (2021) support this by stating that ITSM is a collection of frameworks that support the company in managing customer services.

2.3 ITSM Processes

The IT operation in the insurance industry has evolved over the years (Lucio Nieto & Gonzalez-Bañales, 2020). IT effectiveness demands systematic, high-quality management, which can be achieved through compensating ITSM (Hamranová et al., 2020). ITSM processes aim to outline IT operational management as a service and align IT with business objectives within its partners and supplies (Pereira et al., 2020). ITSM process maturity can be measured by performing a process maturity assessment, and comparing the organisation's process performance against a best-practice process (Jaadla & Johansson, 2020).

2.4 ITSM Benefits

The objective of an organisation with IT departments is to provide an information processing capability that benefits the business in rendering effective service delivery (Orta & Ruiz, 2019). Kumar et al. (2018), Melendez-Llave and Dávila-Ramón (2018), and Shilenge and Telukdarie (2021) table the following as ITSM benefits in the insurance industry:

Improving efficiency: helping the organisation maximise its resources.	Increasing self-service productivity: enabling users to solve more incidents on their own.
Reducing operational costs: scaling operations.	Ensuring better service and customer experience: improving service strategy and incident response.
Creating risk-free implementation of IT change.	Improving access and communication channels: between IT operators and businesses.
Improving accountability through standardisations: IT policies compliance improvement.	Reducing unnecessary workload: automating tasks to eliminate tedious manual labour.
Improving accountability within business functions: introduce process monitoring activity.	Enabling more effective planning.
Improving effectiveness: a formalised system that drives improvement over time.	Saving the business time and money.

(continued)

Improving efficiency: helping the organisation maximise its resources.	Increasing self-service productivity: enabling users to solve more incidents on their own.
Improving visibility into operation: IT and business strategy alignment.	Ensuring better transparency into IT processes and services.
Improves visibility into performance: standardize and optimised service delivery.	Ensuring higher return on IT investments.
Promoting collaboration between different business functions.	Managing change more efficiently.

2.5 ITSM Importance

ITSM plays an important role in an insurance company, as can be seen from the many benefits that ITSM offers (Floerecke, 2021). Therefore, it would be key to discuss the importance of ITSM.

Serrano et al. (2021) describe the importance of ITSM as improving the documentation process, employee satisfaction, efficient internal communication, IT-business alignment, organisational competitiveness, IT expenses, IT service rendering, staff reduction, customer satisfaction, and the improvement of the organisation's revenues bottom-line.

2.6 ITSM Governance

Owing to ITSM's importance in an insurance company, ITSM must be well governed (Dwivedi et al., 2021). Zaydi (2021) describes ITSM governance as a need to establish an organisational structure, making sure that responsibilities and accountabilities are clear, thresholds and escalation management processes are properly defined, and service scope and technology processes are well established.

ITSM governance advocates an organisational structure to implement defining roles and responsibilities, and establish councils to manage operational thresholds and govern IT processes (Sarah & White, 2019). ITSM governance embodies mechanisms that monitor, define, and access both in-transition and operating processes (Lucio-Nieto & Gonzalez-Bañales, 2021).

2.7 ITSM Challenges

ITSM is a customer-centric approach that was designed to support service delivery by promoting the co-creation of IT service values and rendering several efficient IT deliverables (Ramakrishnan et al., 2020). As per Shrestha et al. (2020) and Floerecke

(2021), ITSM challenges in the insurance industry originate from deficiency in ITSM process knowledge, lack of effective communication in driving and resolving service delivery incidents, lack of knowledge and no understanding of end-to-end business by process managers, unmet client service delivery expectations on quality and value rendering of resources, task-oriented people culture, wrong motives for choosing ITSM, limited knowledge transfer among peers, deficiency in accountability, misunderstanding between services and incidents requests, addictive to repetitive tasks, and customer retention out of the process.

Shrestha et al. (2020) further suggest that ITSM implementation might fail if people involved in the implementation have no idea of what ITSM exactly is, how it should be implemented, and what it can do for the business. Lack of proper focus on ITSM could lead to its unsuccessful implementation. A quick assessment of the ITSM framework, focusing on the features of each solution matching the organisation's objectives and requirements should make the selection of the ITSM framework process easy (Floerecke, 2021).

2.8 ITSM Frameworks

ITSM practices were industrialised to offer guidelines for improving IT operations (Sukmana et al., 2019). ITSM implementation in the insurance industry promotes IT and business strategy alignment (Lucio Nieto & Gonzalez-Bañales, 2020). The insurance industry endorses ITSM frameworks to drive IT capabilities, promote high-quality IT services, and enable organisations to measure service delivery (Hamranová et al., 2020).

At present, there are several ITSM frameworks devoted to project management, service management, and people management (Ilieva & Gaydarov, 2021). Chakir et al. (2020), Marchão et al. (2020) list the best, commonly known and used ITSM frameworks as follows:

- The International Information Security Standard 27,001 (ISO 27001): focuses on specific governance issues.
- The International Information Security Standard 27,002 (ISO 27002): focuses on IT security management.
- Project Management Body of Knowledge (PMBOK) and Project in Control Environment (PRINCE2): focuses on project management.
- Information Technology Infrastructure Library (ITIL): focuses on IT service management.
- Control Objectives for Information and Related Technology (COBIT): focuses on overall organisational governance.

COBIT and ITIL are commonly used in the South African insurance industry for IT governance and IT service delivery improvement (Al-Fatlawi et al., 2021). COBIT provides the roadmap for what needs to be implemented to bridge the crucial gap between technical issues, business risks and control requirements, and ITIL offers the means of achieving those goals (Bawono et al., 2021). The current study will consequently focus on ITIL and COBIT ITSM frameworks as they offer guidance for the effective management of IT services (Mohamed et al., 2020).

2.9 South African Insurance Industry

The obligation of every insurance service provider is to manage, define and deliver effective IT services that support customer needs and business goals (Orta & Ruiz, 2019). ITSM was designed to institutionalise activities, processes and roles of IT service delivery while adapting standards from the ITIL and COBIT practices (Goldkuhl & Nordström, 2014). ITSM framework implementation in the South African insurance industry remains a challenge to add visibility and velocity to the ITSM workflow (Cusick, 2020).

Chege (2021) describes the South African insurance industry as one of the key sectors in economic development. South African insurance organisations have been endorsing ITSM to improve their contribution to the financial market space since the early 2000s (Sarah & White, 2019). Customer relations, better risk management, a stable IT environment that promotes growth, and a cost-effective environment are all benefits of effective ITSM implementation (Hermita et al., 2020). According to Leketi and Raborife (2019) and Marchão et al. (2020), the South African insurance industry uses COBIT and ITIL in endorsing professional disciplines of ITSM. ITIL is a merged process reference model for ITSM, which is based on both simulation and business process management life cycle models (Orta & Ruiz, 2019). Nugroho (2020), on the other hand, describes COBIT as a comprehensive resource that consists of all the information organisations must adhere to, to embrace their governance and control framework.

3 Methodology

The qualitative research approach was deliberately chosen to be the most appropriate tool to meet the study's main objective of understanding ITSM challenges in the South African insurance industry (Creswell & Zhang, 2009; Chummun, 2012).

In South Africa, insurance companies are listed on the JSE when they operate according to the constitutional documents and laws of the country (Obagbuwa et al., 2021). The population of this study was selected from all short-term and long-term insurance companies from the top 20 insurance companies listed on the JSE, based on their profit margin in no particular order, for the period of 1 January 2020 to 31 December 2021 (Muteba Mwamba & Florentin Angaman, 2021). The five top insurance companies were selected based on their customer satisfaction index, which was concluded in the financial year from 2020 to 2021 in terms of product quality, price, and customer service. The researcher approached the five insurance companies based on the suitable criteria as described above, but only obtained ethical approval from two of the insurance companies to participate in the study. The remaining three insurance companies believed this research study might place them at a competition risk and it is for this reason that they chose not to participate in this study.

The two companies offer short-term and long-term insurance products, thus covering both insurance coverage offerings. The ITSM information for the two JSE-listed companies was not available publicly but was obtained through the insurance companies' employees. The employees who were selected to complete the questionnaire were the individuals performing their duties under ITSM implementation, thus ensuring the reliability of the data.

Primary data for the present study were collected from IT employees of the two JSE-listed insurance companies, following ethical clearance approval, for the period of 1 January 2020 to 31 December 2021. The questions formulated in the questionnaire were informed by the information obtained from the literature review. Following the necessary approvals, the questionnaire was then distributed to the 230 IT employees of the two JSE-listed insurance companies, which offer long- and short-term insurance product services. The questions were designed in such a way as to ensure that the respondents could easily complete them. The questionnaire had agree/disagree scale questions and yes or no questions were used, supported by comment boxes where respondents could add more detailed insight. The completed questionnaires were available on the Monkey Survey platform to the researcher.

Upon results obtained, only 118 employees participated and not all questions were answered as they depended on each employee's exposure to the ITSM process and the maturity of the organisation in ITSM implementation. The incomplete answers were not left out with the aim of getting access the ITSM implementational maturity level. The questionnaire was pilot tested on a selected group of participants working in ITSM implementation. The pilot assessed whether the questions in the questionnaire met the intended objective of the study to ensure validity. No major amendments were required following the pilot test. The reliability of the research instrument was ensured by pilot testing the questionnaire with a selected population of participants who were working in ITSM implementation.

For this study, the data were exported into Microsoft Excel worksheets for its ability to capture the experiences and perceptions of employees from the insurance sector. The research findings were based on the data collected from the questionnaire; and Sect. 4 displays the recorded results from employees, rather than being based on theories or evidence; therefore, this helps to avoid any bias relating to the researcher's pre-existing beliefs about the phenomenon (Yamada et al., 2021).

The two JSE-listed insurance companies that were analysed in this study were listed for the period of 1 January 2020 to 31 December 2021. The period chosen was based on the common and popular two ITSM frameworks, namely ITIL and COBIT, and version release dates. ITIL Version 4 is the latest version of the ITSM framework, which was released in February 2019 to provide a digital model that enables insurance organisations to co-create effective value from their IT-supported product and services (Ayuh & Chernovita, 2021). COBIT Version 5 was also released in 2019 as the latest version of implementing ITSM practices and helping insurance organisations meet business challenges in aligning IT strategy with organisational goals.

4 Presentation of the Findings

This section presents the questionnaire responses to the ITSM implementation challenges of the two insurance companies selected for this study. The section further discusses the results of the 118 employees of the two JSE-listed insurance companies that have ITSM implementation. Each discussion depends on the results obtained from each specific section of the questionnaire.

The questionnaire was electronically distributed to 230 employees from the two JSE-listed insurance companies in South Africa. A total of 118 employees, who are at minimum IT operational level and above, completed the questionnaire. All the respondents have an influence on the decision making of ITSM and ITSM framework implementation at the organisational level and thus their responses were deemed useful, despite the ITSM implementation maturity in the organisation.

The research questionnaire's overall response results are as follows:

- Total response: 118 respondents.
- Completion rate: 62% of each respondent finished all the questions. The remaining 38% is assumed that the question is not applicable, or the respondent is not sure.
- Typical time spent by the respondent: 6 m:59 s.
- Most neglected question: *Given an opportunity to enhance ITSM implementation in your organisation, which ITSM framework and version will you use?* Neglected: 55.

Table 1 displays the responses by participants to each research objective.

5 Discussion of the Findings

This section will now align the research results to the research objectives mentioned earlier, which sought to establish the following:

- To understand ITSM practices in the South African insurance industry context.
- To investigate which frameworks are being used within the South African insurance industry context in implementing ITSM.
- To determine to what extent ITSM customers understand ITSM principles.
- To identify ITSM implementational areas for improvement.

Table 1 Findings from participants

Research Objective	Question	Question Objective	Results	Results Conclusion
Impact of ITSM implementation on the insurance industry	How many years of ITSM exposure do you have within the insurance industry?	The objective of this question was to establish years of ITSM exposure within the insurance industry.	42% of the respondents had between 6 and 10 years of ITSM exposure, following 26% of 17 years average on the "OTHER" years option, 13% had between 0 and 1 year, and 19% had between 2 and 5 years of exposure.	The average number of years of ITSM exposure within the insurance industry is 17 years.
	Does your organisation have ITSM implemented in driving the service delivery?	The objective of this question was to establish if the respondent agrees that ITSM implementation is driving the service delivery in the insurance industry. In the literature review, it was established that ITSM promotes service delivery within the insurance organisation's IT department (Cusick, 2020).	79% of the respondents agree and 6% do not think ITSM implementation drives the service delivery.	Based on the results and the sample size, it is not clear enough if ITSM is believed to improve service delivery, thus opening an additional area for future research.
	Much research indicates that ITSM adds value to the insurance industry. Do you agree with this statement?	The objective of this question was to establish if the respondent noticed the implementation value of ITSM in the insurance industry. Much research indicates that ITSM practices emphasise IT services in generating value for the customers, which can be applied in all organisations with an IT background (Lucio-Nieto & Gonzalez-Bañales, 2021).	96% of the respondents agree with noticing the value, while 4% do not see any ITSM value.	Based on the above results and comments, the ones who are exposed to ITSM agree to have seen the value of ITSM in the insurance industry, which is in line with the literature review.

(continued)

Table 1 (continued)

Research Objective	Question	Question Objective	Results	Results Conclusion
	Do you think the current ITSM implementation in your organisation promotes better customer service?	The objective of this question was to establish if the respondent notices any positive impact that ITSM implementation poses on customer service. Further to the ITSM value noted in the preceding section, according to Berihun and Teferi (2021), ITSM and IT have become core pillars in driving customer expectation satisfaction within the South African insurance industry.	83% of the respondents see customer service improvement, while 17% of the respondents do not see any impact.	Based on the above results, there is still room for improvement for an organisation to drive service delivery with ITSM implementation.
	ITSM implementation is believed to stimulate support within an insurance environment. Do you agree with this statement?	The objective of this question was to establish if the respondent agrees with ITSM implementation supporting the insurance environment. The literature review indicates that ITSM implementation is believed to stimulate support for an insurance environment (Mulders, 2020).	92% agreed to the statement, while 8% of the respondent disagreed.	Based on the above, it looks as much as ITSM exists in an organisation, the processes are not followed, hence the benefits are not seen, thus also opening future research areas.
	ITSM implementation is believed to stimulate planning within an insurance environment. Do you agree with this statement?	The objective of this question was to determine if ITSM implementation has improved any of their organisation's planning. ITSM covers managerial aspects of IT business, including	88% of the respondents agree with the statement, while 12% disagree.	Based on the results received, there are some other fundamental methodologies implemented in the organisation together with ITSM, thus causing the ITSM benefits not

		IT planning and any other provisions to advance customer services (Verma, 2016).		being clear enough. A potential research area exists to find what works with ITSM and what the organisation needs to get rid of.
	When ITSM implementation is followed, it is said to encourage security within an organisation. Do you agree with this statement?	The objective of this question was to determine if ITSM implementation has any benefits to the organisation's security. ITSM implementation addresses security elements on ISO 27001 and ISO 27002 ITSM frameworks (Verma, 2016).	87% of the respondents agree with the statement, while 13% disagree.	These results are concerning given that respondents believe that security should be in the centre; however, they end up having multiple ITSM frameworks for different processes, thus opening an area of future research on ITSM covering security elements in all its frameworks
	When ITSM implementation is followed, it is said to encourage better infrastructure within an organisation. Do you agree with this statement?	The objective of this question was to establish if the respondents know any ITSM implementation and infrastructure objectives. Lazic and Groth (2019) posit that ITSM can be conceptualised as the solution to the problem of aligning the relationship between the business and IT infrastructure domain to take advantage of IT opportunities and capabilities.	95% of the respondent agree with the statement while 5% disagree.	Based on the above, with a small sample, it seems like ITSM indeed promotes infrastructure efficiency and availability.
ITSM commonly used frameworks	Which of the following ITSM frameworks does your organisation use?	The objective of this question was to determine which ITSM framework the respondent company uses to establish common and popular ITSM frameworks.	74% of the respondents use ITIL as the framework to implement ITSM. Followed by 15%, which is where they use more than one framework,	Based on the results above, ITIL is the most used framework. Additionally, the combination also works better.

(continued)

Table 1 (continued)

Research Objective	Question	Question Objective	Results	Results Conclusion
		It has been noted that ITIL and COBIT are the two commonly used ITSM frameworks in the insurance industry (Mora et al., 2020).	COBIT has 4%, 6% is distributed equally on ISO 27001/2, and 2% is PMBOK.	This is pleasant as it is in line with the literature review.
	Does your organisation make use of the latest version of the selected ITSM framework?	The objective of this question was to determine if the latest version of the corresponding ITSM framework is used. According to VanHaren (2012), ITIL Version 4 aims to partially solve the insurance industry's problem by reducing the system outage through change management. In addition, according to Amorim et al. (2021), COBIT Version 5 is not a framework for aligning business processes, managing technology, making IT-related decisions, or determining IT strategies or architecture.	70% use the latest version of the ITSM framework.	ITIL's latest commercialised version is Version 4, ITIL Version 3 thus not being the latest version. The results indicate that the respondents are not sure or not even paying attention to what is commercialised at which point, which is concerning and can be classified as an ITSM implementational challenge.
	ITSM frameworks are said to enable the organisation to achieve a better business-IT orientated environment. Do you agree with this statement based on your organisation's ITSM implementation?	The objective of this question was to establish the business-IT-oriented objective that ITSM frameworks offer. According to Moudoubah et al. (2021), both COBIT and ITIL frameworks assist organisations in better accomplishing an effective IT service and better business-IT orientation.	85% of respondents agree with the statement, while 15% disagree.	Based on the results, a mixed conclusion can be drawn. Also, based on the results obtained so far, ITSM implementation in these organisations is co-existent implementation, making it difficult to draw the ITSM benefits without any coexistence influence.

Improvement for the use of ITSM	Based on your experience, do you think ITSM implementation in the insurance industry could have a direct impact on service delivery?	The objective of this question was to establish if ITSM implementation has a direct impact on IT service delivery. According to Mora et al. (2020), common ITSM fundamentals focus on end-to-end optimisation of service delivery.	96% of the respondents think ITSM has an impact on service delivery, while 4% do not believe so.	The results are aligned with the ITSM benefits noted in the literature, in promoting improved efficiency, effectiveness, visibility into operations and productivity.
	Do you think ITSM implementation can be enhanced to improve IT service delivery?	The objective of this question was to establish if the current ITSM implementation can be enhanced to work better in the insurance industry. Kaiser (2021) describes the relevance of ITIL as a framework to manage operations effectively and suggests a new version of ITIL that is tailored for the digital era in the insurance industry context.	96% of the respondents believe that enhancement is needed, while 4% are happy with the product out on the shelf.	It is concerning as this came to be the second most neglected question, with 47 respondents neglecting this question, which might mean respondents are happy with the framework principles or they are not involved at all.
	Given an opportunity to enhance ITSM implementation in your organisation, which ITSM framework and version will you use?	The objective of this question was to determine if the respondents were keen on using a different framework should they be given an opportunity to implement ITSM.	71% prefer ITIL, and the rest is spread across other ITSM frameworks.	This is in line with the current study definition of ITIL as the commonly preferred ITSM framework in the South African insurance industry

5.1 First Research Objective

According to Galup et al. (2020), ITSM implementation in the South African insurance industry is not supported by skilled personnel to implement ITSM and improve service delivery. The first research objective of the current study was to understand ITSM practices in the South African insurance industry. The objective's aim was to assess if ITSM had either a negative or a positive impact on the South African insurance industry. Furthermore, the aim was to evaluate if the ITSM implementation impacted service delivery.

It was found that the appetite for the development and implementation of ITSM for service delivery was not strong, regardless of the insurance organisation's size. The basis of the present study was not driven by company size, but rather by the products offered by the insurance company. From the questionnaire answers, it was noted that there was a significantly greater awareness of the need for ITSM professional disciplines in the South African insurance industry. It was also noted that, despite the product range offering, ITSM in the South African insurance industry assumes greater risk due to unholistic implementation (Jiang & Cameron, 2020).

5.2 Second Research Objective

The second research objective of the study was to investigate which frameworks were used within the South African insurance industry context in implementing ITSM. The objective was to assess which ITSM frameworks were commonly and preferably used in the South African insurance industry. A further objective was to find out which versions of the frameworks were used. The research results affirmed the literature review on ITIL and COBIT to be the most popular and commonly used ITSM frameworks (Mora et al., 2020).

From the questionnaire distributed to the experts in the field, it was noted that ITIL was the preferred framework and most understood in the market in driving effective service delivery. Furthermore, the ITIL framework works well too when paired together with COBIT. This research objective addressed in the literature study showed that different frameworks addressed different elements, and that ITIL was the potential framework with minimal adjustment needed to work in the insurance context.

5.3 Third Research Objective

The third research objective of the study was to determine to what extent ITSM customers understand ITSM principles within the South African insurance industry. The objective aimed to assess the level of skill set available and support in driving service delivery through ITSM implementation. The obvious concern in concluding this study is that ITSM is indeed implemented in insurance organisations; however, the benefits are not fully embraced.

The answer is a lot more complex than had initially been anticipated. Many factors influence the implementation and success of ITSM in an insurance organisation. This could be a separate future area of research altogether. However, from the research undertaken, a few key matters are noted that could assist the South African insurance industry to move in the right direction:

- ITSM principles alone should not be driving service delivery. This just adds another layer to the existing practice, making the implementation more complex, which will affect performance negatively rather than positively. ITSM implementation should take place using the bottom-up approach with assurance implementation being the top layer.
- There must be buy-in from all operational levels in the organisation. The executive team needs to drive the ITSM but will need support from its non-executive counterparts. Awareness and practice by the entire organisation will embed ITSM into the organisation's culture.

5.4 Fourth Research Objective

The last research objective of the current study was to identify the area of improvement in ITSM implementation. The objective aimed to analyse individual reviews of out of the shelf ITSM practices meeting business needs on an operational level and above.

The common and most preferred ITSM framework used to implement ITSM professional principles, presented in the preceding chapters, was shown to be ITIL. Based on the results obtained in the research, ITIL is still a preferred framework; however, other subordinate principles need to be in place to overcome ITIL shortcomings in IT security.

Employing the correct skills to assist in the adoption of the appropriate ITSM policies to the organisation, aligns with a regulatory requirement, and is comparable to the available best practices. Waiting for ITSM-affected individuals to develop these ITSM policies and piggybacking off them will not kick-start the process. The South African insurance industry needs to contract these skills externally to enable the development of the base and then train a core team to implement and practise ITSM holistically and continuously within the organisation to drive service delivery. When this team executes ITSM initiatives within the organisation, the requirement for compliance will filter through to all employees and drive the awareness, knowledge, and skills that will enable compliance and thus restore the effective ITSM compliance circle.

6 Conclusion

At the inception of this study, there was an expectation that the two JSE-listed insurance companies, in their service delivery, had implemented ITSM, and that all its principles were followed.

The study results are thought-provoking; increasing awareness for framework designers and embracing various ITSM implications due to not everyone understanding their role in the implementation and driving service delivery. Based on the study, it can be concluded that a wide range of companies' employees are not fully equipped with ITSM implementation and framework values. Based on the questionnaire response rate, the question neglect rate, and the completion rate, there are still many people who are undecipherable driven by ITSM while not understanding ITSM professional principles. The co-existence of other service delivery methodologies and ITSM frameworks also emerged as a big factor in employees not understanding ITSM.

This research suggests that the ITSM committees and all stakeholders who are affected should upskill employees who use their products to ensure that all the benefits can be enjoyed, with fewer challenges. There is a significant lack of information from the employees of the two organisations in terms of ITSM implementation practices based on the results obtained. Furthermore, change management should not be the only motive for implementing ITSM, as the results postulated.

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Impact of Agricultural Credit on Technical Efficiency and Technological Gap Ratio Among Coffee Farmers in Kenya

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Abstract Extant literature demonstrates that the technical efficiency (*TE*) of coffee farmers is on a downward trajectory but there are scarce resources to link how agricultural credit is directly instrumental in improving technical efficiency. Therefore, this study was conducted in Kiambu County in Kenya to determine the impact of agricultural credit on technical efficiency and the technological gap ratio among coffee farmers. The data for the study from 2017 to 2019 was obtained from Commodity Fund and farmers' cooperative societies. The paper adopted a meta-frontier framework to estimate the technology gap ratios (*TGR*) for participating (*PF*) and non-participating (*NPF*) coffee farmers in the credit program. The empirical results disclose that *PF* and *NPF* adopted heterogeneous production technologies given their dissimilar access to credit that is essential for the acquisition of inputs. The *TGR* for *PF* and *NPF* was 0.969 and 0.747 respectively which indicate that *PF* operated on a loftier frontier in comparison to *NPF*. Thus, *PF* were technically efficient as compared to *NPF* given their very small gap between regional and meta-frontier efficiencies (*MFE*). The Decision-Making Unit inefficiency estimates indicate that the credit program interventions aimed at efficiency improvement in *NPF* should be targeted at enhancing farmers' access to optimal combinations of inputs and advisory services through extension visits. Consequently, this paper recommends policies tailor-made to promote credit access by smallholder farmers to improve *TE* and *TGR*.

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1 Introduction

The coffee sector has continued to play a key role in Kenya's economy accounting for more than 40% of the total value of exports and providing livelihoods to more than 700,000 smallholder farmers (KNBS, 2022). These smallholder farmers produce about 70% of total coffee production yet they are faced with numerous limitations to their farming operations. As a result, the production of coffee has now shrunk substantially from 1985 to 2019 by 0.42% (Wanzala et al., 2022; ICO, 2019). Apart from the international coffee regulatory framework and inept management of the sector locally, the declining productivity of coffee has been blamed on inefficiency in resource use and of which several studies have attested to its roles in undermining households' food security status and income (Chege, 2012). Hence, the Government of Kenya (GoK) formed Commodity Fund in 2006 to provide agricultural credit to smallholder farmers to boost coffee productivity. Nevertheless, statistics by ICO, FAO and the Coffee Marketing Board of Kenya manifest coffee as a moribund sector. These diminishing levels of production coffee with concomitant to—among other things—sub-optimal utilization of feasible input-output combinations due to poor access to credit (Theuri, 2012). Thus, if the GoK is providing credit to smallholder farmers, the central question is: does access to agricultural credit improve the farmers' efficiency and reduce the technological gap ratio (*TGR*) in coffee production? Therefore, the objective of this study is to determine whether access to agricultural credit has an impact on the technical efficiency (*TE*) and technology gap ratios among coffee farmers in Kenya.

Efficiency is a very important factor of productivity growth especially for smallholder farmers who have limited funds and poor access to credit to develop and adopt improved technologies (Vassiloglou & Giokas, 1990). Generally, a firm is technically efficient if it produces a given level of output using a feasible number of inputs (Wadud, 2003). To improve the farmers' productivity, inputs must be used more efficiently with attention paid to attaining maximum production without wastage (technical efficiency) (Skevas et al., 2014). Several approaches like economic analysis (Beltrán-Esteve et al., 2014) and met a production function (Lau & Yotopoulos, 1989; Hayami, 1969) have been developed purposely to analyze firm efficiency. These approaches do not take into consideration the technology gap characterized by the incomparability of data and the differences in the basic economic environment (Villano et al., 2010). Further, it's a challenge to specify an appropriate production function when using these approaches. To overcome this challenge, stochastic meta-frontier and Data Envelopment Analysis (DEA) meta-frontier techniques are used because they can calculate the meta-frontier of all groups' frontier and estimate both the *TE* and *TGR* (Villano et al., 2010). Unlike the stochastic meta-frontier, this study will use DEA because it does not require the specification of a particular functional form for the technology (Rao et al., 2003).

The extant literature on *TE* and *TGR* using the meta-frontier approach is very limited (Ramalho et al., 2010). Even more limited is the literature on the impact of agricultural credit on TE and *TGR* using the meta-frontier approach. Further, most studies that investigate TE use a dummy variable as a proxy for access to agricultural credit (Beltrán-Esteve et al., 2014). However, this study deviates from these past studies and used meta-frontier analysis and real credit data from 2017 to 2019 collected from Commodity Fund. The result of this study contributed to efficient decision-making at the farm level and assisted policymakers in the devising of relevant policies geared to improve coffee productivity. The study findings also avail pertinent information on the impact of agricultural credit on *TE* and *TGR* to academia and agricultural extension workers.

2 Theoretical Framework

The theoretical framework for this study is grounded on the theory of the firm that presupposes that firms exist and make decisions with an intention to maximize profits (Debertin, 2012). The firms are interested in the market because it offers them with an opportunity to make both supply and demand decisions after which they are able to allocate resources economically and efficiently in line with the models ensuring maximization of the net profits (Ogada et al., 2014). According to Farrell (1957) school of thought, economic efficiency consists of allocative and technical efficiency. That in order for a firm to be economically efficient, it first needs to be technically efficient. This means that a firm that is technically efficient will utilize the right combinations of inputs (labour, fertilizer, agrochemicals) to get the right output mix given the prices of the commodity in the market. Thus, the relationship between technical and allocative efficiency can be illustrated by Fig. 1.

The estimation of technical efficiency (*TE*) in this study follows a framework based on agricultural production theory where a smallholder coffee farmer (*SHCF*) are presumed to use owned and bought inputs to produce coffee. The rational *SHCF* is assumed further that to produce coffee he embraces production technology which utilizes a set of inputs; $\left(x_1, \ldots, x_m \epsilon \Re_+^n\right)$ to produce a positive set of outputs $\left(y_1, \ldots, y_m \epsilon \Re_+^m\right)$. The collection of all set of the feasible input-output (or production possibility set) for *SHCF* is the subset *T* of the space $\Re_+^{m+n}$ is therefore represented as:

$$T = \left((YX)X \text{ can produce } Y \in \Re_+^{m+n}\right) \tag{1}$$

The *SHCF* can devise any production plan from any input-output combination thereof. However, given that this is an optimization problem centered on the available inputs and outputs, analysis of the efficiency of a coffee farm requires estimation strategy that selects a combination of inputs which yields maximum output as per its achievable output set (Varian & Varian, 1992). Theoretically, the

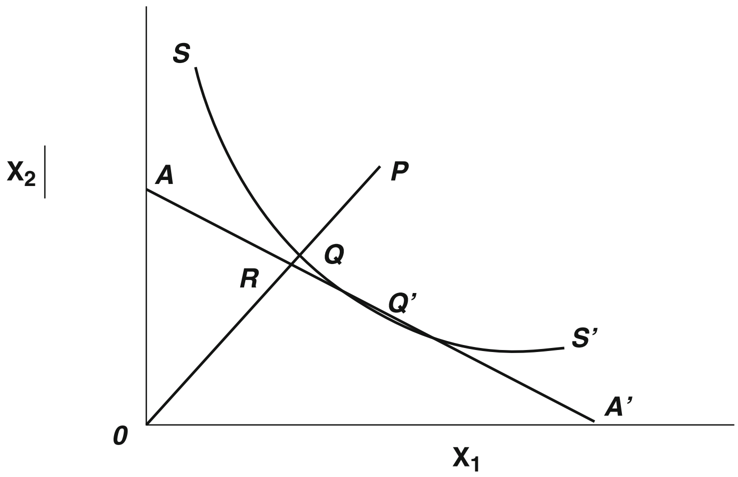

Fig. 1 The relationship between technical and allocative efficiency

production function exemplifies the optimum output that can be obtained from a given set of inputs (Jehle & Reny, 2011), and can be stated as:

$$Y = F\left(X^{t'}, Z^{t'} | \sum_{i} Z^{t'}, \overline{M}\right) \quad (2)$$

Where, Y is a vector of coffee production, X, W and Z is set of inputs such as land, labour and fertilizer respectively that is purchased. The t^i indicates the seasonality and progressive nature that characterizes coffee production phases as dictated by biological physiognomies. Such a recursively distinguishable arrangement of the production procedure implies for example that labor used for pre-harvest activities such as pruning, fertigation and weeding is different from labor used to harvesting activities. The M on the other hand denotes a set of optimum use of services made possible by the fixed stock of *SHCF*-controlled inputs in each step of the production process. The Eq. (2) illustrates that there are some exceptional characteristics that exemplify coffee production and the extent to which the characteristics occur in agriculture has insinuations on how they can be portrayed mathematically (Karagiannis, 2014).

The inputs-output behavioral relationship can further be characterized by returns to scale (RTS) in production whereas farm's technology can exhibit constant returns to scale (CRS) or variable return to scale (VRS) (Debertin, 2012). In CRS production technology, a given percentage increase in inputs leads to the equal percentage increase in output while in the VRS, a given percentage increase in inputs is characterized by less than or more than proportionate rise in output (Daraio & Simar, 2007). Representation of returns to scale in agricultural production analysis indicates whether any efficiency gains can be obtained by modifying the scale of operation of a farm (Tolga et al., 2009). The theoretical foundation is that a production function connotes the boundary of the PPS and a farm can be said to be efficient in utilization of inputs if it's operating on this production function (Ogada et al., 2014). In this perspective, efficiency in coffee production reflects the selection of production technology that results into optimum output given available combination of possible input set. This in tandem with the description of *TE* in conventional economic theory.

The efficiency scores obtained from SFA will be used to analyze variations in the scores across *SHCF*. There are many factors which causes variation in the *TE* scores which include farm and agency, agent and structural and policy and institutional factors (Yoshiko, 2011). The marketing channels for the sale of coffee beans, access to extension and credit services constitute the policy and institutional factors. The farm specific factors include area under coffee cultivation, age of the coffee tree, coffee variety planted, the overall farm size and number of coffee trees per acre. The *SHCF* characteristics which may affect efficiency include the household head education level, $SHCF's$ age, size of the household and labour structure in coffee farming.

2.1 Empirical Review

Extant literature is dominated by studies focusing on the technical efficiency of agricultural and livestock production and their associated factors influencing the *TE* levels (Geffersa et al., 2022). Meaningful empirical research on *TE* and *TGR* is scanty (Danso-Abbeam & Baiyegunhi, 2020). This is especially after the seminal papers of Battese and Rao (2002), Battese et al. (2004), and O'Donnell et al. (2008) who used the meta-frontier model to estimate technology gaps for entities embracing diverse available technologies. This study was conducted as a result of very few studies that have been dedicated to providing in-depth insights on agricultural productions under different technological formations, especially credit programmes. So far, there is even less research that examined *TE* and *TGR* on coffee productivity, especially in Kenya. Given that studies using meta-frontier models on coffee are scanty, this study reviewed empirical studies focusing on other crops.

The study by Adeleke et al. (2021) used a stochastic meta-frontier approach to assess the technological gap ratio of the different food crops. The study randomly sampled 1678 food crop farmers from General Household Survey-Panel Wave 2 from the National Bureau of Statistics for the six geo-political zones in Nigeria. The mean *TE* and mean *TGR* of the food crop farmers were 56.3 percent and 71.6 percent respectively indicating sub-optimal production of food crops than the potential output in Nigeria. Aloysius et al. (2021) used stochastic meta-frontier analysis to scrutinize *TE* and *TGR* of tomato production in Northern Nigeria. The study randomly sampled 359 farmers in Plateau, Kano and Taraba. The study indicated that farmers from the Plateau region were more technically efficient than their counterparts in Kano and Taraba. However, the *TGR* mean for Taraba farmers was tangential to the meta-frontier output indicating that these farmers used innovative farming technology. The *TGR* mean of Plateau and Kano farmers was less than the optimal output by 0.5% and 1.2% respectively. The study concludes that there is a need for sensitization of Plateau and Kano farmers on sound agricultural technology for optimum production.

In the study conducted by Majiwa and Mugodo (2018) on *TE* and *TGR* among rice farmers in Kenya, a stochastic meta-frontier model was used to estimate *TE* and *TGR*. The results indicate a lower mean between different rice growing regions; that is, Mwea (0.556), West Kano (0.475), Ahero (0.402), and Bunyala (0.45). Their study also discovered a wide gap between rice-producing regions. Specifically, the *TGR* values for Mwea, West Kano, Ahero, and Bunyala were 0.998, 0.605, 0.482, and 0.48, respectively. This study digressed from the above studies by focusing on coffee and using a quasi-experimental design.

2.2 Theoretical Basis of Efficiency Estimation

2.2.1 Data Envelopment Analysis

Efficiency is a very important factor of productivity growth especially for smallholder farmers who have limited funds and poor access to credit to develop and adopt improved technologies. It is described as the ability of DMU to produce optimum output(s) with the least combinations of feasible inputs relative to competitors subject to available resource limitations and operational settings (Coelli & Perelman, 1999). The efficiency of DMUs can be examined by using either the parametric (SFA) or non-parametric techniques (DEA). Due to the agility of DEA and data limitations, this study employed DEA in efficiency estimation. The DEA can be estimated by using an input-oriented approach (IOA) and an output-oriented approach (OOA). The IOA to *TE* estimates the degree to which a DMU can minimize resources to produce the same level of output. As such, IOA denotes the resource intensity of DMU relative to optimum practice. The output-oriented approach (OOA) assesses the degree to which a DMU can maximize the output level given the same quantity of inputs. A DMU is said to be inefficient if it does not operate along the optimum practice frontier and efficient if vice versa. Therefore, for OOA, the linear programming problem for the i^{th} firm can be estimated as:

$$Max\ \theta_1$$

Subject to:

$$\theta_1 b_{w,u} \leq \sum_{w=1}^{W} z_w b_{w,u} \qquad \forall u \tag{3a}$$

$$\sum_{w=1}^{W} Z_w b_{w,v} \leq a_{w,v} \qquad v \in \pi \tag{3b}$$

$$\sum_{w=1}^{W} Z_w b_{w,u} = \eta_{w,v} a_{w,v} \qquad v \in \widehat{\pi} \tag{3c}$$

$$\eta_{w,v} \geq 0 \qquad v \in \widehat{\pi} \tag{3d}$$

where v is a scalar indicating the extent by which the farmer can increase output; $b_{w,\ u}$ is the output u by farm w; $a_{w,\ v}$ is the input v used by farm w and Z_w are weighting factors. The resources encompass of both variable and fixed factors delineated by the set as $\widehat{\pi}$. To estimate the capacity of output quantity, lessening restrictions of the bounds on the sub-vector of variable inputs $a\widehat{\pi}$ is necessary. The lessening restrictions of the bounds on the sub-vector is realized by permitting the inputs to continue unconstrained by introducing a measure of the input utilizing rate ($\eta_{w,\ v}$) assessed in the model for each farm w and variable input v (Färe et al., 1994). The technically efficient capacity utilization (TECU) grounded on observed output (u) becomes:

$$\varpi = \frac{b}{b^*} = \frac{b}{\theta_1 b} = \frac{1}{\theta_1} \tag{4}$$

where b^* is the capacity-output grounded on observed outputs b. The ϖ measure ranges from zero to one, with one implying full capacity utilization (i.e., 100% of capacity) which assumes efficient use of all the inputs exists at their optimal capacity. Efficiency measures of less than one indicates that the firm operates at less than full capacity given the set of fixed inputs.

2.2.2 Meta-frontier Analysis

The input and output sets are linked with meta-technology set (Eq. 3) with the output set is hereby defined for any input vector a as:

$$p = \{(b) : (a, b) \in \mathcal{T}\} \tag{5}$$

Equation ss holds if and only if a inputs will produce b outputs by utilizing one or more of the definite technologies $\mathcal{T}^1, \mathcal{T}^2, \ldots, \mathcal{T}^k$ associated with a particular region. It is anticipated that the meta-technology would meet all the requirements of both convexity axiom and production axioms, articulated as the convex hull of the pooled region-specific technologies as follows:

$$\mathcal{T}^* \equiv Convex\ Hull \left(\mathcal{T}^1 \cup \ldots \mathcal{T}^2 \cup \ldots \mathcal{T} \cup^k\right) \tag{6}$$

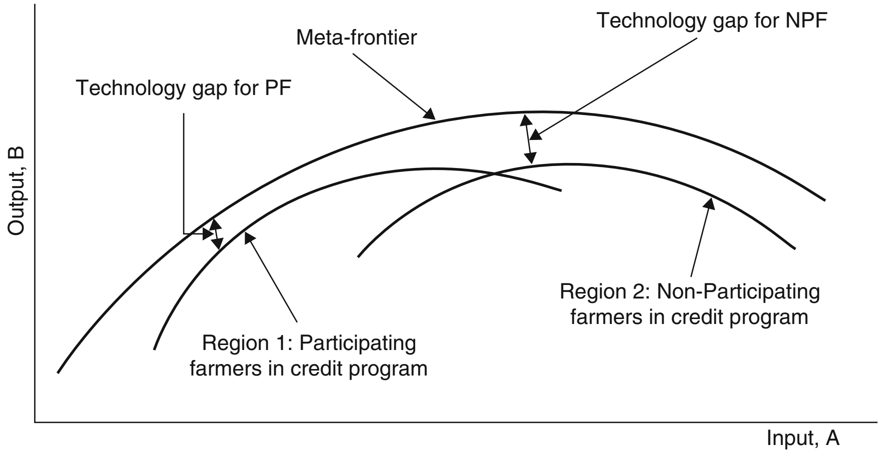

Fig. 2 Meta-frontier illustrating technology gap between PF and NPF

Thus, using the meta-technology $\mathcal{T}^*$ and if the input-output distance function is known, the results of any specific region of a given output $\left(D_o^*(a,b)\right)$ and input distance functions $\left(D_i^*(a,b)\right)$ would be follows:

$$D_o^k(a,b) \geq D_o^*(a,b), \qquad k = 1, 2, \ldots, n \qquad \text{iff} \quad D_i^k(a,b) \leq D_i^*(a,b) \tag{7}$$

Thus, the output-oriented *TGR* (denoted in equation as: ξ) between the region k technology and the meta-technology is computed as follows:

$$\xi_o^k = \frac{D_o^*(a,b)}{D_o^k(a,b)} \tag{8}$$

The *TGR* when considering the output-oriented technical efficiency measure (ϖ) is specified as follows:

$$\xi_o^k = \frac{\varpi_o^*(a,b)}{DE_o^k(a,b)} \tag{9}$$

The relationship between participating and non-participating coffee farmers in the credit program is illustrated by two regional frontiers (Region 1 and Region 2 respectively), meta-frontier and technology gap in Fig. 2. Thus, the DEA approach was used to estimate the efficiency of coffee productivity for and non-participating coffee farmers in the credit program and the meta-frontier approach was used to determine technology gap ratios. The output meta-frontier refers to the boundary of this output set which fulfills the typical regularity characteristics (Färe & Primont, 1995).

2.3 Regression Analysis of Determinants of Efficiency

The problems concomitant to embracing either Tobit or linear models in the DEA framework prompted Papke and Wooldridge (1996) to develop fractional regression model (FRM). The FRM is hailed for being able to overcome the limitation of dependent variables defined on the unit interval, irrespective of whether boundary values are observed (Ramalho et al., 2010). Further, it captures nonlinear data thus yielding better estimates. Finally, it helps predict response values within the interval limits of the dependent variable and last. As a result, Ramalho et al. (2010) commend use of the FRM to estimate determinants of efficiency in the second stage. However, FRM assumes a functional form of b which applies that the preferred constraints on the conditional mean of the regressand, as follows:

$$E(b|a) = \Phi(A\psi) \tag{10}$$

where $\Phi(.)$ represents a nonlinear function which fulfils the condition $0 \leq \Phi(.) \leq 1$. Note that FRM can be estimated using either of the four link functions of conditional mean (logit, loglog, probit or complementary log) whose partial effects is specified as:

$$\frac{\delta E(b|a)}{\delta x_j} = \psi_{j\Phi}(A\psi) \tag{11}$$

The efficiency scores of one-part and two-part models are usually dissimilar given that one-part models assume that:

$$E(\psi|w) = \Phi(w\delta) \tag{12}$$

where $\Phi(.)$ signifies a probability distribution function ($w\delta$). Since δ is unknown parameter, it is approximated by quasi-maximum likelihood which is specified as:

$$LL(\psi)_{max} = \sum_{i=1}^{n} (\widehat{\psi}_i \, log(\Phi(w_i\delta)) + (1 - w_i) \, log(1 - \Phi(w_i\delta))) \tag{13}$$

In the two-part models, the whole sample is used to estimate the model:

$$Prob(\psi_i = 1|w) = F\left(w_i'\beta\right) \tag{14}$$

Where probability distribution function and unknown parameter are represented by β and F respectively. It is assumed that $(\widehat{\psi}_i|w_i) = \Phi\left(w_i'\delta\right)$ for the responses in (0, 1) for the second part. The inefficiency determinants were six: age, gender and education of the coffee farmer. Further, number of extension visits, variety of the coffee and cropping system. The *TE* scores were regressed not only against age, gender and education of the coffee farmer but also number of extension visits, variety of the coffee and cropping system. It was anticipated that some variables could influence efficiency either in a positive or negative way.

3 Methodology

3.1 Study Area and Data Sources

Kiambu County has twelve sub-counties where coffee is mostly concentrated within five sub-counties (Kiambu, Thika, Githunguri, Gatundu South and Gatundu North) that have 11 farmers' cooperative societies (FCS). The twelve sub-counties are ecologically homogeneous in terms of climate and edaphic factors. The research design for this study is a non-experimental research design. The study relied on secondary data on credit extended to smallholder coffee farmers in Kiambu County in Kenya in the custody of ComFund. The data was collected from participating and non-participating farmers in the Commodity Fund credit programme.

The data were treated in two ways. Firstly, the data on *SH*CF*s* who received credit from the Fund for coffee cultivation was considered as a treatment group. The treatment was the credit received by *SH*CF*s* from ComFund and not the coffee project itself. The treatment group was in three sub-counties of Githunguri, Gatundu South and Gatundu North. Secondly, the *SH*CF*s* who did not receive credit from the Fund was considered as a control group. The control group was in two sub-counties of Kiambu and Thika. To minimize potential spillovers of agricultural inputs to the control group in their sublocations, the selected sublocations whereby farmers received agricultural credit were mapped. Whereas other studies have used a 1 km buffer zone for example, (Chung et al., 2018), this study used a 6 km buffer zone to separate the treatment and control groups' sublocations. This is consistent with existing literature (Banerjee et al., 2010; Miguel & Kremer, 2004).

3.2 Population and Sample

The study targets *SH*CF*s* in Kiambu County who obtained credit from ComFund. The sample size was determined as follows. The initial step entailed obtaining a list of all *SH*CF*s* in Kiambu County who got credit from ComFund from 2016 to 2020. From the ComFund database, 15,003 *SH*CF*s* from Kiambu County who applied for credit in this period (2016–2020). According to the subject matter specialist at the Ministry of Agriculture, custodian of data at ComFund and our knowledge on the ground, all these farmers were financially constrained and had failed to access credit from commercial banks. ComFund on the other hand had limited funds and could only advance credit to only a few numbers of *SH*CF*s* who applied for their credit at any given time. Therefore, ComFund advanced credit to only 3589 *SH*CF*s* in this period which translates to 23.9% of those *SH*CF*s* who received credit and 76.1% of

*SH*CF*s* who did not receive credit. This scenario creates a natural experiment for impact evaluation. Of the 3589 *SH*CF*s*, 87 farmers were maintaining records of coffee production.

In consistency and reliability of the data and in consultation with the subject matter specialist at the Ministry of Agriculture and custodian of data at ComFund, going forward only these 87 farmers with records were included in the study as the treatment group. Using these inclusion criteria, 87 farmers were found to be commercially oriented and had a credit portfolio between KShs. 100,000 to KShs. 1,000,000. The credit range (KShs. 100,000 to KShs. 1,000,000) provided a sufficient census size to conduct an impact evaluation and to answer convincingly the policy question of interest. To identify the quasi-control group, the 87 farmers were selected using a propensity matching score (PMS) which runs a logistic regression of observable characteristics.

These characteristics were the overall size of the land, land under coffee, the ratio of coffee trees over the size of the land under coffee, the number of hired laborers over the size of the land under coffee, the farming system, credit from other sources, the ratio of cost of agrochemicals over the size of land under coffee, the ratio of cost of inputs over the size of land under coffee, and the ratio of coffee harvest over size of land under coffee. Similarly, only those farmers in the control group who maintained coffee production records were considered in the study. Therefore, the total manageable sample size for the study is 174. To limit digression on the objective of the study, neither empirical processes nor theoretical underpinnings on PSM are provided but can be availed on request.

3.3 Smallholder Coffee Farmer Characteristics

In Table 1, the mean age difference of negative 2.53 between participants and non-participants *SHCFs* was statistically significant at a 5% level. This indicates that age has a negative correlation with *SHCFs* participating in credit scheme. The mean gender and education differences between participants and non-participants *SHCFs* were 1.08 and 0.76 respectively. These two mean differences were statistically significant at a 1% level of significance. Therefore, it can be deduced that

Table 1 Summary results for mean difference of SHCFs characteristics

Demographics characteristics	Participants ($n = 87$)	Non-Participants ($n = 87$)	Mean difference	t-statistic
	Mean	Mean		
Age	48.47	51.00	−2.53**	−2.132
Gender	1.78	0.70	1.08***	11.958
Education	1.89	1.13	0.76***	6.360

*** 1% level of significance, **5% level of significance, *10% level of significance
Source: Authors computation, 2023

Table 2 Summary results for mean difference of output and inputs of SHCFs

Smallholder coffee characteristics	Participants ($n = 87$) Mean	Non-Participants ($n = 87$) Mean	Mean difference	t-statistic
Labor cost	271,542.20	187,351.40	84,190.87***	6.184
Structure of labor	0.16	0.27	−0.11***	−8.703
Fertilizer	1508.45	1064.68	443.77***	5.735
Farming area	5.354368	4.47977	0.89**	2.935
Age of the coffee tree	32.30	35.76	−3.46*	−1.663
Agrochemicals	62133.32	44336.21	17797.11***	5.180
Extension visits	1.48	0.92	0.56**	2.737
Coffee variety	0.40	0.79	−0.39***	−5.698
Cropping system	0.79	0.83	−0.05	−0.779
Yield	1909.22	1340.46	568.76***	5.449

*** 1% level of significance, **5% level of significance, *10% level of significance
Source: Authors computation, 2023

gender has a positive correlation with participants *SHCFs* in credit scheme. Further, participant *SHCFs* were more educated than non-participants *SHCFs*.

In Table 2, the mean difference of the cost of labor (KShs. 84,190.87), fertilizer (443.77 Kg), agrochemicals (KShs. 17,797.11) and yield (568.76 Kg) was statistically significant at a 1% level. Further, each of these four variables (cost of labor, fertilizer, agrochemicals and yield) had a positive correlation with *SHCFs* participating in the credit scheme. Yield is a common yardstick used to assess the performance of agricultural activities and the mean difference indicates that the *SHCFs* participating in credit scheme obtained higher yields than non-participating *SHCFs*. The size of land under coffee cultivation and the number of extension visits for participants were more than non-participants by 0.89 ha and 1 (~0.89) and it was significant at a 5% level. The non-participating *SHCFs* had a 11% more of their family members in their labor structure than participating *SHCFs*. Further, the age of trees maintained by the non-participating *SHCFs* was three and a half (3.46) years more than the participating *SHCFs*. Nevertheless, although the mean difference of crop variety is statistically significant at a 1% level, it has a negative value (−0.39) with *SHCFs* participating in the credit scheme. This might be because the seedlings might be more expensive than the traditional variety and the biological dimension between planting and the first harvest. There was no significant difference in the cropping system between the *SHCFs* participants and non-participants of the credit program.

4 Results and Discussion

4.1 Hypothesis Testing for Technical and Scale Efficiency

To find out whether mean *TE* was statistically different across the *PF* and *NPF* frontiers, a Kruskal Wallis Test was undertaken. The null hypothesis that means *TE* of *PF* and *NPF* was not significantly different from each other was tested. From Table 3, the result shows that the mean *TE* was statistically different across the *PF* and *NPF* given that the null hypothesis ($p-$ value $= 0.028$) was rejected at a 5% level of significance. This suggests that efficiencies between *PF* and *NPF* is different which paves way for the computation of *TGR* between *PF* and *NPF*.

4.2 Pooled and Regional Meta-Frontiers for Participating and Non-Participating Farmers in the Credit Program

Table 4 summarizes meta-frontier efficiencies (MFE) results for *PF* and *NPF* for the pooled data. The *TE* of *PF* and *NPF* was 0.674 and 0.636 respectively.

Table 4 provides the regional efficiencies (RE) and *TGR* of *PF* and *NPF*. In general, a regional frontier that overlaps with the meta-frontier indicates a *TGR* that is equal to 100%. However, the mean *TGR* estimate for *PF* is 0.969, suggesting that the maximum output that is feasible for a farmer with credit is only about 97% of the output that could be realized using the technology represented by the meta-frontier. Therefore, a higher *TGR* value of 97% infers a lesser technology gap between the *PF* frontier (Region 1) and the meta-frontier. Nevertheless, *NPF* produces coffee outputs under conditions that are more limiting than *PF* due to poor access to credit. As a result, a mean *TGR* of 0.747 shows that *NPF* could, at best, produce only 75% of the coffee output that could be obtained using the limited technology or input. Hence, a lower *TGR* value of 75% infers a higher technology gap between the *NPF* frontier (Region 2) and the meta-frontier. Consequently, *TGR* results indicate that *PF* were technically efficient than *NPF* given the very small gap between Region 1 and meta-frontier. On the other hand, *NPF* operate with a higher *TE* and are far away from the meta-frontier. So, to improve their performance, it is essential for *NPF* to follow a strategy that shifts the Region 1 frontier approaching the meta-frontier. Consequently, the *NPF* frontier is more likely to move towards the meta-frontier through accessing agricultural credit to acquire and utilize optimum inputs and new applicable innovative technologies. These results are echoed by Majiwa and Mugodo (2018) who indicate that different regions exhibit different result

Table 3 Hypothesis testing results for technical

Variable	$p-$ value	Conclusion
Technical efficiency	0.0278	Reject

Source: Authors computation, 2023

Table 4 Meta-frontier regional efficiencies estimates from pooled data

	Participating Farmer (Number of DMUs)					Non-Participating Farmer (Number of DMUs)				
	2017	2018	2019	Total	%	2017	2018	2019	Total	%
<0.1	0	0	0	0	0.0	12	0	0	12	4.6
0.1–0.1999	3	0	0	3	1.1	20	0	0	20	7.7
0.2–0.2999	11	0	0	11	4.2	13	2	1	16	6.1
0.3–0.3999	7	6	0	13	5.0	13	0	2	15	5.7
0.4–0.4999	15	14	0	29	11.1	8	1	1	10	3.8
0.5–0.5999	7	16	1	24	9.2	8	4	2	14	5.4
0.6–0.6999	3	24	10	37	14.2	4	7	4	15	5.7
0.7–0.7999	12	14	37	63	24.1	1	26	18	45	17.2
0.8–0.8999	14	13	38	65	24.9	2	44	49	95	36.4
0.9–0.9999	15	0	1	16	6.1	6	3	10	19	7.3
1	0	0	0	0	0.0	0	0	0	0	0.0
Mean	0.6746					0.6368				
Std Dev	0.1889					0.2728				
Std Error	0.0117					0.0169				
Minimum	0.1114					0.0432				
Maximum	0.9503					0.9701				
Median	0.7279					0.7615				

NB-% of the Total Number of DMUs
Source: Authors computation, 2023

technology gaps depending on their level of access to technological set used for production (Table 5).

These findings have a significant policy implication linked to the prospects to minimize the productivity gap by increasing *TE* in coffee husbandry. For *PF* in the short run, it is anticipated that *TE* will be responsive to optimum use of the available technological set. But at the same time, this region is, on average, close to the meta-frontier and to move forward is expected to involve more agricultural credit to develop and implement modern technologies. This result is consistent to Adeleke et al. (2021) who attributes different sub-optimal production of food crops to different heterogeneity of technology used by farmers in different zones. As a result, apart from sensitizing farmers to use sound agricultural technology (Aloysius et al., 2021), there is need to facilitate farmers to access credit in order to acquire these technologies.

4.3 *Results for Determinants of* TE

Table 6 summarizes the technical efficiency estimates from one-part (linear models) and two-part FRM models. In the one-part models (linear models), education of the household head, age of the farmer, number of extension visits, coffee variety and

Table 5 Regional meta-frontier efficiencies estimate for participating and non-participating farmers

	Participating Farmer (Number of DMUs)					Non-Participating Farmer (Number of DMUs)				
	2017	2018	2019	Total	%	2017	2018	2019	Total	%
<0.1	2	0	0	2	0.8	0	0	0	0	0.0
0.1–0.1999	8	0	0	8	3.1	0	0	0	0	0.0
0.2–0.2999	11	0	0	11	4.2	0	0	0	0	0.0
0.3–0.3999	8	1	2	11	4.2	3	0	0	3	1.1
0.4–0.4999	12	1	0	13	5.0	8	0	0	8	3.1
0.5–0.5999	10	0	1	11	4.2	3	0	0	3	1.1
0.6–0.6999	8	6	4	18	6.9	8	1	0	9	3.4
0.7–0.7999	10	34	48	92	35.2	9	21	0	30	11.5
0.8–0.8999	10	45	32	87	33.3	13	51	33	97	37.2
0.9–0.9999	8	0	0	8	3.1	43	14	54	111	42.5
1	0	0	0	0	0.0	0	0	0	0	0.0
Mean	0.695					0.852				
Std Dev	0.199					0.118				
Std Error	0.012					0.007				
Minimum	0.064					0.306				
Maximum	0.949					0.972				
Median	0.776					0.892				
TGR	0.969					0.747				

NB-% of the Total Number of DMUs
Source: Authors computation, 2023

crop system was significant at the 5% and 10% levels, thereby explaining why some farmers were efficient. On the other hand, gender did not explain the inefficiency since the variables were not statistically significant. Similarly, logit and cloglog model at the 5% and 10% levels of significance demonstrate that household head, age of the farmer, number of extension visits, coffee variety and crop system explained the inefficiency. However, gender did not explain the inefficiency since the variable was not statistically significant. At the 10% and 5% significance levels for the logit and cloglog model, household head, age of the farmer, number of extension visits, coffee variety and crop system explained the inefficiency.

An examination of the second part of the two-part models showed that the education of the household head, age of the farmer, number of extension visits, coffee variety and crop system was the reason why some farmers were more efficient (at a 5% significance level for the cloglog and at 10% significance level for the logit model). In examining why some farmers were inefficient, their gender reduced their efficiency scores at the 5% and 1% significance level for all the models. Further, education of household head, age of the farmer, number of extension visits, coffee variety and crop system reduced their inefficiency at the 5% and 10% significance levels for all the models.

Table 6 Summary results for determinants of TE

					Two-part models						
	One-part models				1st Part		2nd Part				
Variable	Linear	Tobit	logit	loglog	logit	cloglog	Linear	logit	Probit	loglog	cloglog
Intercept	0.671*** (0.033)	0.712*** (0.145)	0.792*** (0.156)	0.959*** (0.122)	0.401 (0.663)	0.270 (0.609)	0.597*** (0.216)	0.331** (0.133)	0.208** (0.083)	0.610*** (0.101)	−0.128 (0.090)
Gender	−0.018 (0.018)	−0.075 (0.079)	−0.101 (0.086)	−0.075 (0.068)	−1.211*** (0.346)	−1.110*** (0.318)	−0.033 (0.075)	−0.068 (0.066)	−0.042 (0.041)	−0.056 (0.050)	−0.040 (0.045)
Education	0.037*** (0.010)	0.156*** (0.036)	0.165*** (0.039)	0.123*** (0.030)	0.157 (0.186)	0.177 (0.168)	0.136*** (0.040)	0.175*** (0.035)	0.109 *** (0.021)	0.131*** (0.026)	0.121*** (0.023)
Age of farmer	−0.001 (0.0005)	−0.003 (0.002)	−0.004* (0.002)	−0.002 (0.001)	−0.047*** (0.013)	−0.046*** (0.013)	−0.004 (0.003)	−0.0004 (0.002)	−0.0002 (0.001)	−0.0002 (0.001)	−0.0004 (0.001)
Extension visits	0.011** (0.005)	0.047** (0.019)	0.044*** (0.021)	0.033** (0.016)	0.145 (0.105)	0.101 (0.097)	0.049* (0.025)	0.069*** (0.016)	0.043*** (0.010)	0.051*** (0.011)	0.049 *** (0.011)
Crop system	0.032* (0.017)	0.135* (0.071)	0.150** (0.076)	0.118** (0.058)	1.363*** (0.470)	1.259*** (0.447)	0.134* (0.077)	0.020*** (0.063)	0.012*** (0.039)	0.016*** (0.047)	0.012*** (0.043)
Variety	0.077*** (0.023)	0.334*** (0.088)	0.362*** (0.096)	0.274 *** (0.078)	0.739* (0.396)	0.792** (0.354)	0.243*** (0.077)	0.341*** (0.081)	0.213*** (0.050)	0.256*** (0.063)	0.234*** (0.053)

*** 1% level of significance, **5% level of significance, *10% level of significance

Source: Authors computation, 2023

The result indicates that the gender of the coffee farmer has a positive impact on efficiency. This means that males were more efficient in coffee farming than females. The finding is consistent with other studies (Koirala et al., 2014; Gebre et al., 2021). For example, using 2012 farm-level cross-sectional data from the Central Luzon Loop Survey, Koirala et al. (2014) empirically demonstrate that females are inefficient in farming (Koirala et al., 2014). Research shows that overall, women provide the bulk of low-paid labour in the coffee sector, yet it is men who have control over the majority of the profits (Dijkdrenth, 2015; Lyon et al., 2017; Kangile et al., 2021). Men also control most productive assets, often hold management positions in cooperatives, have more access to credit and market information. This has been caused mostly by deeply rooted societal biases that result in many hindrances for females compared to males (Kangile et al., 2021; ICO, 2018). These inequalities precipitate inefficiencies in coffee productivity because females, who execute vital farm tasks, are not accessing the resources critical in maintaining or improving their output. However, numerous quantitative studies of discrepancy in agricultural productivity demonstrate that males and females are equally efficient farmers when gender differences in respect to utilization of agricultural inputs are normalized (Aguilar et al., 2015; Quisumbing et al., 2014).

The level of education of the farmer was found to have a significant positive impact on efficiency. For instance, after reviewing 18 different types of research conducted in 13 developing countries, Lockheed et al. (1980) also found that the level of education has a positive impact on efficiency and a mean of 4 years of education increases output by 7.4%. This is true especially in technological advancement settings or contemporary conditions such as access to credit (Eisemon & Nyamete, 1988; Ram, 1980). This is maybe credited to skills and knowledge attained from formal education. Such skills assist farmers to develop capacities to efficiently employ the latest technological inputs set that boost agricultural productivity. Other researchers note that empirically there is either no sufficient evidence or weak evidence to demonstrate that education certainly has a positive impact on agricultural productivity (Ferreira, 2018). They argue that access to innovative technologies is also required to synergize education to realize higher agricultural productivity.

The mean age of farmers was 50 years is expected because most youths don't own land and those who have access to land are not interested in farming coffee because they perceive it as not "sexy" or "cool". However, research has shown that youthful farmers often embrace the latest technologies more rapidly than elderly farmers (Nchare, 2007). Consequently, the result of this study indicates that the age of the farmer was found to have a significant negative impact on efficiency. The result is consistent to Wambua et al. (2021) who found that the age of the farmer increased inefficiency among a sample of 376 farmers from 6 cooperative societies. The number of extensions visits was found to have a significant positive impact on efficiency. This is because farmers need information on inputs, sound agronomic practices, expected changes of prices of their products and weather forecasts among others to be efficient (Aker, 2011). Similar results were reported by Ngango and Kim (2019) who found that the number of extension visits by farmers increased inefficiency among a sample of 320 in Rwanda Northern Province.

The result indicates that the crop system has a significant positive impact on efficiency. This means that monocropping was more efficient in coffee farming than intercropping. However, intercropping of cash crops with food crops is deeply entrenched by smallholders' farmers since it influences technical efficiency in the farming operations, productivity gains, acts as a buffer against uncertainties and risks for food security and farm returns (Coelli & Fleming, 2004). The result is consistent with past studies in Colombia and Costa Rica that indicate that monocropping can improve harvested green coffee on average from 575 kg/ha to more than 1250 (Bertrand et al., 2011). On contrary, Sarmiento-Soler et al. (2020) and Acosta-Alba et al. (2020) reported dissimilar results. Sarmiento-Soler et al. (2020) sampled 810 coffee trees from 27 farms in Mt. Elgon in Uganda to investigate the effect of the cropping system on coffee output and found that coffee is intercropped with bananas (which provides intermediate shade) had a higher output per ha than monocropping.

Adoption of improved coffee variety has been established to be crucial to boosting coffee productivity, particularly in Brazil, Colombia and Vietnam. In this study, the farmers who adopted improved coffee varieties (Batian and Ruiru 11) were more efficient than the coffee farmers who planted traditional varieties. The finding is consistent with the majority of the extant literature which finds improved coffee varieties are more efficient than traditional varieties (Ngango & Kim, 2019). This is because traditional varieties are more susceptible to fungal diseases (coffee berries disease (CBD) and coffee leaf rust (CLR)) and insect pests (Wambua et al., 2021). CBD can wipe 100% of the crop while CLR and pests such as berry borer can reduce the productivity of coffee by 30–35% (Alwora & Gichuru, 2014; Lechenet et al., 2017). Thus, investing in improved coffee varieties is instrumental in enhancing coffee productivity.

5 Conclusion and Recommendations

The main objective of this study is to determine the impact of agricultural credit on coffee productivity in Kiambu in Kenya. Meta-frontier analysis was used to estimate the TE and *TGR* for participating (*PF*) and non-participating (*NPF*) coffee farmers in the credit program. Contrary to previous notion emanating from some previous research findings, the *TGR* results empirically demonstrate that agricultural credit has significant impact on coffee efficiency. The *TGR* estimates validate that coffee productivity by *PF* operated on a loftier frontier in comparison to *NPF*. This stalks from the fact that access to credit would results to acquisition of optimal combination of inputs and lead to improvements in technical efficiency and result into a higher output level. The better timing of farm operations (for instance, planting, irrigation, fertilizer application and weeding) may increase real output and actually reduce the gap with the frontier. The Decision-Making Unit inefficiency estimates indicate that the credit program interventions aimed at efficiency improvement in *NPF* should be targeted at enhancing farmers' access to optimal combinations of inputs and advisory services through extension visits. Consequently, this paper recommends policies tailor-made to promote credit access by smallholder farmers to improve *TE* and *TGR*.

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Revenue Disclosure Practices of Companies Within the Construction and Telecommunications Industries: Significant Judgements and Uncertainties

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Abstract The inherent significance of revenue for companies and users of financial statements prompted many debates on revenue recognition that ultimately led to the development of IFRS 15: *Revenue from contracts with customers*. The adoption of IFRS 15 has resultantly increased consistency in revenue recognition within industries, improving overall comparability, understandability, and transparency of financial information. In applying IFRS 15, some areas would require management to make significant judgements and estimates. Judgments and estimates play an integral role in financial reporting and the disclosure thereof results in useful information for the users of financial statements. This study analysed the significant judgements made and uncertainties addressed by management concerning the IFRS 15 disclosures in the financial statements of listed telecommunications and construction industries. The study followed a qualitative approach based on an empirical content analysis. This included an index study and thematic content analysis to assess the existence and quality of disclosures in the financial statements of the selected companies. The findings of the index study suggest that the level of compliance within the telecommunications and construction industries is relatively consistent. The construction industry's percentage of compliance is slightly lower than that of the telecommunications industry throughout the periods. The thematic content analysis suggests that the disclosures provided by management within the construction industry achieved, on average, a higher rating with a greater percentage of the population receiving an excellent rating. Over the period of review, the existence and quality of disclosures were improved to enhance the usefulness of the financial information for the users.

Keywords Revenue · Disclosure · Significant judgements · Uncertainty · IFRS 15

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1 Introduction

Revenue is an important indicator when considering a company's financial performance and ability to generate income. Investors extensively use this measure when making financial decisions about companies (De Sa Silva, 2017). Before the development of International Financial Reporting Standard (IFRS) 15 *Revenue from Contracts with Customers*, companies within the construction industry applied International Accounting Standard (IAS) 11 *Construction Contracts.* In contrast, all other industries applied IAS 18 *Revenue* (IASB, 2022a).

With the application of these standards, it was difficult for investors to ensure that they were comparing similar financial information when assessing companies and making financial decisions (Bohusova & Nerudova, 2009). The inherent significance of revenue in financial reporting has resulted in many debates and ongoing discussions about how revenue should be recognised (Wagenhofer, 2014). The previous accounting standards were insufficient in providing guidance on how companies should recognise, measure, and disclose revenue (De Sa Silva, 2017; Van Wyk, 2017). The objective stated within IFRS 15 *Revenue from Contracts with Customers,* seeks to ensure greater transparency for the users of the financial statements through the robust disclosures required by the standard. This aligns with the global standard setters' objectives to ensure more consistent concepts are applied throughout, improving comparability within the entities across industries and geographical locations (IASB, 2022a).

In addition to the general disclosure requirements stated in IAS 1 *Presentation of Financial Statements,* IFRS 15 requires specific disclosures for significant judgements relating to revenue recognition (IASB, 2022a, 2022c). This additional disclosure relates firstly to the timing and satisfaction of performance obligations and whether revenue is recognised over time or at a point in time (Coetsee et al., 2022; IASB, 2022a). Secondly, the significant judgements associated with determining the transaction price require disclosure, specifically the variable consideration and significant financing components (Coetsee et al., 2022; IASB, 2022a).

The construction and telecommunications industries have been impacted more than others by implementing the principles in IFRS 15. This is due to the complexities surrounding the accounting for variable consideration, multiple performance obligations and the recognition of revenue over the life of construction contracts (Dobler, 2008). A study conducted in the context of the European Union (EU), was conducted to determine the level of compliance with the mandatory disclosures espoused by IFRS 15 (Boujelben & Kobbi-Fakhfakh, 2020). This study focused on the top 22 EU listed groups and the transitional disclosures required by IFRS 15, focusing on the telecommunication and construction companies, which, based on the nature of the business operations, are deemed to have been significantly impacted by the implementation of IFRS 15. The findings of this study identified that on initial adoption, the quantity and quality of the IFRS 15 disclosures required improvement and that there was a differing degree of compliance within the respective industries (Boujelben & Kobbi-Fakhfakh, 2020). The companies within the telecommunication industry were more compliant than those in the construction sector (Boujelben & Kobbi-Fakhfakh, 2020).

Van Wyk (2017) and Mahmood (2019) assessed the principles and model applied in IFRS 15 in South Africa companies. They found them to be adequate in providing guidance for the recognition of revenue in the construction and telecommunications industry. A further study has been performed surrounding the revenue recognition practices in South Africa and the decision usefulness of the disclosures. This study focused on the initial adoption of the standards requirements and identified that the companies selected in the study were generally able to apply the standards appropriately in accordance with the analysis for the first time (Coetsee et al., 2022).

2 Research Objective and Contribution

The objective of this paper is to determine whether the significant judgements made, and uncertainties addressed, by management in the determination of the revenue recognition, provide sufficient disclosure to meet the objective of IFRS 15. The paper will focus on the disclosures made within the telecommunications and construction industry. The review will include an analysis of whether the disclosure provided by companies listed on the Johannesburg Stock Exchange (JSE) is useful to the users of the financial statements and whether relevant information is provided for investors, creditors and lenders for them to make informed investing and lending decisions (IASB, 2022c). For the disclosures to be considered useful, it should provide the users with sufficient information (quantity) and quality information. This is achieved if a company adheres to the principles contained in IFRSs. As the companies selected for review are listed on the JSE, they are required as part of the listing requirements to apply the IFRSs (JSE, 2010).

This paper aims to contribute to the academic literature by analysing whether companies in two important industries, impacted by the release of IFRS 15, are providing adequate and useful disclosures to the users of the financial statements specifically related to significant judgements and uncertainties. This analysis will provide preparers of financial statements, academics, and standard-setting bodies with useful information regarding the disclosure practices of companies and how it can be improved. It further provides information for these parties to consider when new standards have to be applied and adopted by companies and whether they have adequate guidance on how to apply the intricacies of new IFRS standards. This paper provides for an analysis of not only the initial year of adoption but also for the first and second year post adoption to determine if any improvements in disclosure occurred over time. Furthermore, by considering two distinct sectors, telecommunication, and construction, that are likely impacted by the implementation of IFRS 15, the nature and scope of the potential effect of IFRS 15 is highlighted. This is especially true when considering that prior to IFRS 15, these two industries' revenue practices were governed by two different standards, IAS 18 and IAS 11. No other studies could be identified that focused solely on the disclosures of significant judgements and uncertainties (and not disclosure practices in general) made by South African companies within the construction and telecommunications industry to inform useful decision-making among the users of the financial statements.

The content of this paper is presented as follows: in the next section the literature regarding the revenue standard and how it has impacted the construction and telecommunications industries is considered. The research methodology is then explained after which the results of the content analysis is provided. The last section consists of the conclusion, the limitations of the paper and the areas for future research.

3 Literature Review

3.1 Development of IFRS 15

The International Accounting Standards Board (IASB) and their American counterpart, the Financial Accounting Standards Board (FASB) entered into a collaborative project to develop the underlying principles that would be required for revenue recognition by both bodies (IASB, 2022b). This process was entered into to ensure consistency in applying both standards across all entities globally (IASB, 2022a). Previous standards implemented by the IASB resulted in inconsistent application across entities as there was limited guidance for specific complex transactions, such as revenue recognition for multi-elemental agreements (Mahmood, 2019). The new standard resulted in a shift in the way in which revenue is assessed by the company and ultimately recognised through a five-step model (IASB, 2022a). Applying this model required additional consideration by management and therefore the disclosure of significant judgements and uncertainties to ensure that the users understand how revenue was recognised.

3.2 Impact of IFRS 15

Studies have explored the impact that the implementation of IFRS 15 had on the financial statements and also on the companies as a whole (De Sa Silva, 2017; Klemmer, 2017; Mattei et al., 2019). De Sa Silva (2017) conducted a study on the adoption of IFRS 15 on JSE-listed companies and found that the implementation of IFRS 15 had an impact on companies beyond that of just financial reporting but also affected the business at five operational levels. The study further found that if the standard is accepted in a positive manner by companies this will ensure that there is greater compliance with the requirements of the standard (De Sa Silva, 2017). This may result in companies applying a mere compliance approach instead of a value-added approach (Hoogervorst, 2013). This is further emphasised by the work of Mattei et al. (2019) in that it was found that the implementation of IFRS 15 will impact the current profit management policies these companies apply. The revisions resulting from the new standard would have extensive impacts on the company's bottom line and the current key performance indicators (KPI'S) in which management's performance is assessed. This is mainly due to the movement in the timing and amount of revenue (Klemmer, 2017).

3.3 Impact of IFRS 15 on Companies Within the Telecommunications Industry

The telecommunications sector experienced concerns surrounding the potential identification of performance obligations and the allocation of the transaction price to those performance obligations (PWC, 2017). Revenue must be allocated to all the performance obligations identified within revenue contracts. Multiple performance obligations may be identified within a telecommunication contract, for instance the sale of handsets, the provision of data or airtime and warranties (Annual Reporting, 2022).

Studies have been conducted on the impact that IFRS 15 would have, upon its adoption, on the companies with the telecommunications industry (Mahmood, 2019; Valle, 2019). Mahmood (2019) assessed the adequacy of IFRS 15 within the telecommunications industry and the complexities surrounding its implementation. The main reasons for the difficulty in its application stem from the previous standard that allowed for additional guidance on the allocation of goods and services identified in contracts (Deloitte, 2014). IFRS 15, however, requires that the revenue be allocated to each distinct good or service on the standalone selling price basis (IASB, 2022a).

Valle (2019) argued that there was limited impact from the implementation of IFRS 15 on the amounts recognised by the telecommunications companies but that significant changes were required to the qualitative disclosures required per the new standard. Key findings identified in the study recognise that the information provided in line with IFRS 15 will provide more useful information to the users of the financial statements (Valle, 2019).

3.4 Impact of IFRS 15 on Companies Within the Construction Industry

IFRS 15 affected the revenue recognition for the construction industry due to the progressive nature of the performance obligations (Van Wyk, 2017). IAS 11 allowed for additional costs incurred during the pre-contract period to be capitalised as opposed to IFRS 15 which only allows for the incremental costs to be capitalised (IASB, 2022a). This change results in a greater expense for these costs reflected in the financial statements. In most cases when looking at construction contracts, the provision of goods and/or services is considered highly integrated and dependant, resulting in the goods and services being seen as one performance obligation (IASB, 2022a).

Hepp (2018) identified additional challenges within the construction industry as the guidance has shifted from applying a percentage of completion method to a more control-based approach. IFRS 15.33 states that, "the control of an asset refers to the ability to direct the use of, and obtain substantially all of the remaining benefits from, the asset. Control further includes preventing other entities from directing the use of, and obtaining the benefits from, an asset" (IASB, 2022a: A901). Therefore, more judgement is required in determining when control transfers (at a point of time or over time) and to determine whether the performance obligation is satisfied. This then further requires more detailed disclosures as to ensure understandability by the users of the financial statements.

3.5 *Results from Monitoring Review Processes*

The JSE, the Financial Reporting Council (FRC) in the United Kingdom (UK) and the European Securities and Markets Authority (ESMA) performed reviews of a selection of annual financial statements of companies in their jurisdictions when IFRS 15 was first adopted. They found the following matters regarding the disclosures related to revenue:

- Many disclosures were identified to be generic, duplicated or boilerplate;
- There was a lack of detail in the disclosures to enable the users to fully understand the judgements and uncertainties applied in the determination of for example the transaction price or the timing of revenue;
- The disclosures did not provide the required level of justification for the selected method used and how this method ensured an appropriate representation of the transfer of good and/or services (EMSA, 2016; FRC, 2019; JSE, 2019, 2021).

IFRS 15 impacted both the telecommunications and the construction industries. Researchers and regulatory bodies have both explored the impact that the implementation of IFRS 15 would have on these industries and disclosures in the financial statements, respectively. However, as the literature shows, significant judgements and estimates would be required for these disclosures. This study focuses on the judgments and estimates disclosed regarding revenue in the financial statements.

4 Methodology

4.1 Paradigm and Research Method

As the paper is aimed at a qualitative approach from the view that the accounting field is a social science, an interpretative approach has been deemed as the most appropriate research method. An interpretative research method provides valuable insight into the subject matter from the perspective, and experience of the people it is involved with (Andrade, 2009). This approach does not solely look at qualitative data but is also appropriate when assessing quantitative data and the impact that this will have on the users of financial statements (Andrade, 2009).

The research methodology that will be applied in this study is an empirical content analysis that is further expanded upon through an index study and thematic content analysis. A content analysis is often used in the assessment of financial reporting and has been assessed as appropriate in the context of this study (Castilla-Polo & Ruiz-Rodríguez, 2017; Coetsee et al., 2022; Duff, 2016). The focal point of a thematic content analysis is to assess and interpret various forms of data, used to communicate the performance of the entity in both a qualitative and quantitative manner to the users of financial statements (Beattie et al., 2004).

4.2 Population Selected

The population used to select the companies for the paper included all of the JSE listed companies. Listed companies were chosen as they are obliged to prepare their financial statements according to IFRS as part of the listing requirements. The selection criteria were then further stratified only to include the companies within the telecommunications and construction industry. All of the companies listed on the JSE as part of the telecommunications sector were selected for the study. The industrial section was selected for further analysis as to isolate the construction companies. This sector was further reviewed to determine the companies with construction as their main operations and these companies were selected as part of the population. One of the companies with construction as their main operations, Basil Read Holdings voluntarily deregistered from the JSE in 2018 and therefore was not included for review (refer to Table 1 for a list of selected companies).

4.3 Data Used in This Study

The data used in this paper was the annual financial statements of the companies as selected and shown in Table 1. The financial statements included in the study assessed the year in which the initial adoption of the standard (IFRS 15) took

Table 1 Selected companies

Companies with the Telecommunications industry	Companies within the Construction industry
Blue Label Telecoms	Aveng Group Limited
Huge Group Limited	Murray and Roberts
MTN Group Limited	Raubex Group Limited
Telemasters Holdings Limited	Stefanutti Stocks Holdings Limited
Telkom Group Limited	Wilson Bayly Homes-Ovcon
Vodacom Group Limited	

place, the first year post adoption and the second year post adoption. IFRS 15 was effective for the financial periods beginning on or after 1 January 2018. All annual reports published since the effective date (1 January 2018) until 2021 were assessed as part of the study (refer to Appendix A).

4.4 Content Analysis

The annual financial statements selected were inspected for the specific disclosures required by IFRS 15.124–IFRS 15.127 (refer to Appendix B). Firstly, an index study was performed to assess the existence of the disclosures within the financial statements. Secondly, a thematic content analysis was performed over the disclosures as to assess quality of the disclosures and ability to achieve decision usefulness for the users. The index study used a yes, no or not applicable (N/A) rating scale to assess whether the disclosures were present within the financial statements. A yes rating was made where the disclosures met the minimum requirements as per IFRS 15, while a no rating did not achieve these minimum requirements. A not applicable rating meant that the disclosure was not relevant to the entity due to the nature of the entity or the accounting policy of the entity.

The thematic content analysis applied a rating scale of excellent, standard, below standard or not applicable. Where the disclosures where specific to the entity and additional information provided to explain the important judgements made, the disclosure was rated as excellent. A standard disclosure rating was deemed to be sufficient to meet the requirements of IFRS 15, while a below standard rating did not meet the minimum disclosure requirements.

5 Findings

In this section the findings of the index study and the thematic content analysis are provided for the following paragraphs from IFRS 15 dealing with significant judgements and uncertainties (refer to Appendix B for detailed information):

- IFRS 15.124—performance obligations satisfied over time;
- IFRS 15.125—performance obligations satisfied at a point in time;
- IFRS 15.126—judgements relating to the transaction price;
- IFRS 15.127—judgements relating to the costs incurred to obtain or fulfil a contract.

5.1 Performance Obligations Satisfied Over Time (IFRS 15.124)

Table 2 includes the findings from the index study, while Table 3 shows the content analysis findings for performance obligations satisfied over time where management are required to disclose:

a. The methods used to recognise revenue; and
b. An explanation of why the methods applied provided a faithful depiction of the transfer of goods or services (IASB, 2022a).

The index study and thematic content analysis findings showed that most companies provided adequate disclosure regarding the requirements of IFRS 15.124(a) but that

Table 2 Index study findings of performance obligations satisfied over time

Year	Rating	IFRS 15.124(a)	IFRS 15.124(b)
Companies within the Telecommunications industry			
Initial adoption	Yes	5	5
	No	1	1
	N/A	0	0
First year post adoption	Yes	6	6
	No	0	0
	N/A	0	0
Second year post adoption	Yes	6	6
	No	0	0
	N/A	0	0
Companies within the Construction industry			
Initial adoption	Yes	5	5
	No	0	0
	N/A	0	0
First year post adoption	Yes	5	5
	No	0	0
	N/A	0	0
Second year post adoption	Yes	5	5
	No	0	0
	N/A	0	0

Source: Authors' analysis

Table 3 Thematic content analysis of performance obligations satisfied over time

Year	Rating	IFRS 15.124(a)	IFRS 15.124(b)
Companies within the Telecommunications industry			
Initial adoption	Excellent	3	0
	Standard	2	5
	Below standard	1	1
	Not applicable	0	0
First year post adoption	Excellent	3	0
	Standard	3	6
	Below standard	0	0
	Not applicable	0	0
Second year post adoption	Excellent	3	0
	Standard	3	6
	Below standard	0	0
	Not applicable	0	0
Companies within the Construction industry			
Initial adoption	Excellent	4	4
	Standard	1	1
	Below standard	0	0
	Not applicable	0	0
First year post adoption	Excellent	4	4
	Standard	1	1
	Below standard	0	0
	Not applicable	0	0
Second year post adoption	Excellent	4	4
	Standard	1	1
	Below standard	0	0
	Not applicable	0	0

Source: Authors' analysis

the disclosures of one company within the telecommunications industry were deemed below standard. This was due to the company omitting the disclosure. The disclosure was however included for the years post the initial adoption and was rated at a level of standard. This was due to the explanations provided that were seen as too general and not specific enough to the entity and its service offerings.

It was identified that another entity within the telecommunications industry provided an explanation that revenue would be recognised over time but was not consistent throughout the years in the classification. Upon inspection of the policy, it was identified that it was consistent for all three years but that the classification was applied inconsistently in the disaggregation of revenue note. Management did not provide additional disclosure to clarify the difference in classification from year to year and therefore this would reduce the comparability of the financial statements to the users as well as the understandability.

The disclosures made by the management of four of the companies within the construction industry achieved an excellent rating. These disclosures were considered to be in detail and would allow additional understanding by the users as to how the timing of revenue is recognised for contract revenue. The entities made specific disclosure surrounding the actual processes applied by management in determining the method for timing of the revenue recognition.

For example, some of the entities included in their disclosure, the methods applied to understand the transfer of the control over the contract, through the review process by the clients engineer or surveys of work performed used to determine progress. These explanations ensure that the user clearly understands managements' judgements in the transfer of the control for the services over time.

For IFRS 15.124b for the companies within the telecommunications industry, the financial disclosures have been assessed at a level of standard as the companies have provided general disclosure that the revenue for the services provided is recognised over the period of the contract in accordance with the units of services provided. The disclosure did not provide additional explanations to specify how the service is recognised and why this provides a faithful depiction of the transfer of services. Management could provide additional disclosure to explain the service and how the transfer of control takes place as to enhance the users understanding. This finding is in line with the findings of Coetsee et al. (2022) that also noted the lack of disclosure of how the method was applied and why that method will be a faithful depiction of the transfer of goods and services.

For the companies within the construction industry, the disclosures included discussion on whether the input or output method was applied along with the reasons as to why the chosen method faithfully depicts the transfer of control. Some companies included additional detail such as how each contract is evaluated to estimate the costs incurred in the construction contract or that surveys are completed to estimate the costs incurred and to measure the progress. These were specific to the entity and ensured that the process followed was set out clearly and explained why the method provided a faithful depiction of the transfer of control.

5.2 Performance Obligations Satisfied at a Point in Time (IFRS 15.125)

Table 4 includes the findings from the index study, while Table 5 shows the content analysis findings for performance obligations satisfied at a point in time where management are required to disclose the judgements made in determining when the control of good and services are transferred to the customer (refer Appendix B).

One company within the telecommunication industry failed to provide the disclosures at initial adoption of the standard. Upon review, it was found that the company had split the revenue recognition in the revenue note between the revenue recognised at a point in time and over time. However, this classification and the

Table 4 Index study findings of performance obligations satisfied at a point in time

Year	Rating	IFRS 15.125
Companies within the Telecommunications industry		
Initial adoption	Yes	5
	No	1
	N/A	0
First year post adoption	Yes	6
	No	0
	N/A	0
Second year post adoption	Yes	6
	No	0
	N/A	0
Companies with the Construction industry		
Initial adoption	Yes	5
	No	0
	N/A	0
First year post adoption	Yes	5
	No	0
	N/A	0
Second year post adoption	Yes	5
	No	0
	N/A	0

Source: Authors' analysis

judgements made by management were not further explained in the policies or notes. Therefore, this company received a rating below standard for this disclosure.

Post adoption the company included further disclosure to explain to the users that they have device sales and that these sales are recognised when the customers take possession of the goods. This information would have been useful to the users of the financial statements in their understanding during initial adoption. As these disclosures were provided in the years post adoption, the company achieved a rating of standard for the disclosure. The disclosure does explain the point in which the transfer of control takes place, but additional information is not provided to make this specific to the circumstances of when the possession is transferred and how this relates to the transfer of control.

Finally, three of the companies within the telecommunications industry provided additional disclosure relating to when the transfer of control takes place and therefore were classified as excellent disclosures. The disclosures have been enhanced by management in that one company included the considerations surrounding the potential right that a customers may have to return the goods (devices) and that revenue is only recognised to the extent that there is no remaining right to return the devices. Another company disclosed that the transfer of control would occur upon the delivery of the goods and when there is no unfulfilling obligation that could affect the customers' acceptance of the product. They further provided that delivery is only met once the goods have been delivered to a specific location and the risks of

Table 5 Thematic content analysis of performance obligations satisfied over time

Year	Rating	IFRS 15.125
Companies within the Telecommunications industry		
Initial adoption	Excellent	3
	Standard	2
	Below standard	1
	Not applicable	0
First year post adoption	Excellent	3
	Standard	3
	Below standard	0
	Not applicable	0
Second year post adoption	Excellent	3
	Standard	3
	Below standard	0
	Not applicable	0
Companies within the Construction industry		
Initial adoption	Excellent	2
	Standard	3
	Below standard	0
	Not applicable	0
First year post adoption	Excellent	3
	Standard	2
	Below standard	0
	Not applicable	0
Second year post adoption	Excellent	3
	Standard	2
	Below standard	0
	Not applicable	0

Source: Authors' analysis

obsolescence have been transferred to the customer. These explanations will supplement the users understanding of when the transfer of control takes place considering management's analysis of the specific situation.

For companies within the construction industry, one finding was identified during the assessment of the financial information. The company's disclosure was rated at standard upon initial adoption and excellent both years post-adoption. The company only had residential developments that were classified as recognised at a point in time. During the initial adoption, it was stated that the control transferred at a point in time or over time depending on the ownership. The disclosure did not provide more detail as to how the ownership would impact the classification and therefore could be considered to be vague and result in a misunderstanding by the users. Upon the first-year post-adoption, additional discussion was included in the disclosure to state that if the property is owned, it is classified as being recognised at a point in time. This therefore provided specific disclosure in terms of the company. During the inspection of the financial information in the second-year post-adoption further disclosure was provided that explained that the transfer would take place upon the issue of a completion certificate or registration if the development is owned. It was noted that management progressively provided additional disclosure that would improve the users understanding of the financial information.

5.3 *Judgements Relating to the Transaction Price (IFRS 15.126)*

Table 6 includes the findings from the index study, while Table 7 shows the content analysis findings for judgements relating to the transaction price where management is required to disclose the following (refer Appendix B):

a. The determination of the transaction price, including the estimate of variable consideration as well as the impact of the time value of money on the consideration.

Table 6 Index study findings of judgements relating to the transaction price

Year	Rating	IFRS 15.126 (a)	IFRS 15.126 (b)	IFRS 15.126 (c)	IFRS 15.126 (d)
Companies within the Telecommunications industry					
Initial adoption	Yes	6	3	6	2
	No	0	3	0	4
	N/A	0	0	0	0
First year post adoption	Yes	6	3	6	2
	No	0	3	0	4
	N/A	0	0	0	0
Second year post adoption	Yes	6	3	6	2
	No	0	3	0	4
	N/A	0	0	0	0
Companies within the Construction industry					
Initial adoption	Yes	5	4	2	5
	No	0	1	3	0
	N/A	0	0	0	0
First year post adoption	Yes	5	3	2	5
	No	0	2	3	0
	N/A	0	0	0	0
Second year post adoption	Yes	5	3	3	5
	No	0	2	2	0
	N/A	0	0	0	0

Source: Authors' analysis

Table 7 Thematic content analysis of judgements relating to the transaction price

Year	Rating	IFRS 15.126(a)	IFRS 15.126(b)	IFRS 15.126(c)	IFRS 15.126(d)
Companies within the Telecommunications industry					
Initial adoption	Excellent	4	2	3	2
	Standard	2	1	3	0
	Below standard	0	3	0	4
	Not applicable	0	0	0	0
First year post adoption	Excellent	3	2	4	2
	Standard	3	1	2	0
	Below standard	0	3	0	4
	Not applicable	0	0	0	0
Second year post adoption	Excellent	3	2	4	2
	Standard	3	1	2	0
	Below standard	0	3	0	4
	Not applicable	0	0	0	0
Companies within the Construction industry					
Initial adoption	Excellent	4	4	2	4
	Standard	1	0	0	1
	Below standard	0	1	3	0
	Not applicable	0	0	0	0
First year post adoption	Excellent	4	3	2	4
	Standard	1	0	0	1
	Below standard	0	2	3	0
	Not applicable	0	0	0	0
Second year post adoption	Excellent	4	3	3	4
	Standard	1	0	0	1
	Below standard	0	2	2	0
	Not applicable	0	0	0	0

Source: Authors' analysis

b. The assessment as to whether the estimate of variable consideration is constrained
c. The allocation of the transaction price, this includes how management estimates the stand-alone selling price of the promised goods or services; and
d. The measurement of obligations for returns, refunds, and other similar obligations.

5.4 IFRS 15.126(a)

The variable consideration is explained to be determined at the inception of the contract and that the revenue is recognised at the amount estimated by management. Most of the financial statements of the companies within the telecommunications industry received a rating of excellent and achieved this classification as management have included the disclosures relating specifically to the determination of the transaction price and whether variable consideration and significant financing components have been considered by management. Some of the disclosures that have enhanced the financial information include judgements by management relating to the specific products and services provided. One of the companies included the judgements for SIM, airtime and data products individually, ensuring that the users can fully understand how the transaction price is measured and how the consideration for each is determined.

For the companies within the construction industry, the transaction price is recognised in accordance with the contracts, with further consideration to the variable elements and the potential for a significant financing component. The rating has been considered mostly excellent as management have disclosed all of the required elements. This has further been applied to the circumstances of the entity. Management have enhanced the disclosures and specifically included when the practical expedient has been applied that allows for no significant financing component to be recognised when the term between payment and the satisfaction of the performance obligation is less than 12 months.

5.5 IFRS 15.126(b)

The requirements of paragraph b are specific to where variable consideration is a consideration by management and the terms in which the variable consideration is recognised as revenue. Per the index study this requirement was not met by three of the companies within the telecommunication industry. The remaining three companies have further included the related disclosure.

Based on the above, two of the three companies have included the variable consideration and applied it specifically to the entity and therefore received a rating of excellent. The remaining company included the disclosure in a more general nature and therefore a rating of standard has been achieved. Three of the companies did not include disclosure relating to constraint surrounding variable consideration. There would be expected to be disclosure relating to management considerations in this area. These disclosures are required to ensure that the users can understand the uncertainty over the revenue recognition; therefore the omission of the disclosure could hinder the decision usefulness of the financial statements. Coetsee et al. (2022) also found a lack of disclosure for some companies in their study regarding the estimate of variable consideration.

For companies within the construction industry, one company did not include the disclosure for any of the years under review. This company achieved a rating below standard for all three years. One of the companies rated upon initial adoption as excellent was subsequently rated as below standard for failing to include the specific disclosures. In the first year of adoption, the company provided detailed disclosure surrounding the variable consideration as to how it was determined and that it would only be recognised once the amount is considered highly probable. A subsequent explanation was then provided that this was based on industry related KPI's. This disclosure is specific to the entity and therefore the rating upon initial adoption was considered as excellent.

5.6 IFRS 15.126(c)

This paragraph requires management to include judgements as to how they allocate the transaction price to the performance obligations within the contract. All companies within the telecommunications industry included the disclosure required per the standard, while three companies within the construction industry did not.

A rating of excellent was achieved for three of the companies within the telecommunications industry upon initial adoption and four companies in the years post-adoption. A rating of excellent was achieved where management included additional disclosure as to how the stand-alone selling price was determined. Upon inspection of the financial statements, it was noted that management included that the stand-alone selling price may be based on the listed price list or the market value. One of the financial statements included exceptional explanations of the process followed by detailing that they maximise external inputs or that the stand-alone selling price is based on the goods of similar products in the external market.

Three companies within the construction industry received a below standard rating for the initial and first-year post-adoption for not providing the necessary disclosures. One of the companies was identified to have not included any disclosure on this requirement in the year of initial adoption or within the first-year post-adoption but did include this in the second-year post adoption. Upon inspection of the financial statements the disclosure provided was detailed and explained all the instances in which the contracts would be considered separately or as a single construction contract. This disclosure provided a holistic view of the performance obligations and management judgements made in the determination of the allocation to the contracts.

The remaining companies were rated at a level of excellent for their disclosure. Where this rating was achieved, management have explained their rationale on determining whether the contracts contain a single or multiple performance obligation.

5.7 IFRS 15.126(d)

Based on the assessment of the financial statements of companies within the telecommunications industry, it was identified that four of the companies did not provide disclosure relating to whether there were any considerations by management as to potential refunds, returns or warranties. It would be expected that management would have included disclosure relating to this requirement. Where the disclosure is not considered significant, this would be relevant to the users of the financial statements to enhance the decision usefulness of the financial information. Therefore, these financial statements received a rating below standard. Management should include disclosure surrounding the judgements made relating to refund, returns and warranties even if these are not considered significant and the reasons why they have concluded them to not be significant.

For companies within the construction industry, most of the disclosures were rated as excellent for this requirement. The rating was achieved as the company provided detailed disclosure as to what the retentions were for and when they will be recognised as revenue. This disclosure enhanced the users understanding. The companies classified within this category provided that the revenue from the retentions would be recognised once the defect liability period have lapsed and once all of the conditions were met. One company even explained further that these retentions guarantee the performance of a contractor and safeguard against future defect in the defect liability period. These retentions are based on the percentage applied in the contracts.

5.8 Judgements Relating to the Costs Incurred to Obtain or Fulfil a Contract (IFRS 15.127)

Table 8 includes the findings from the index study, while Table 9 shows the content analysis findings for judgements relating to the costs incurred to obtain or fulfil a contract (refer Appendix B):

(a) Judgements relating to the determination of the costs incurred to obtain or fulfil a contract with a customer; and
(b) The method applied in amortising this asset over the period.

Table 8 Index study findings of judgements relating to the costs incurred to obtain or fulfil a contract

Year	Rating	IFRS 15.127(a)	IFRS 15.127(b)
Companies within the Telecommunications industry			
Initial adoption	Yes	4	4
	No	0	0
	N/A	2	2
First year post adoption	Yes	3	3
	No	1	1
	N/A	2	2
Second year post adoption	Yes	4	4
	No	1	1
	N/A	1	1
Companies within the Construction industry			
Initial adoption	Yes	1	0
	No	4	5
	N/A	0	0
First year post adoption	Yes	2	1
	No	3	4
	N/A	0	0
Second year post adoption	Yes	2	1
	No	3	4
	N/A	0	0

Source: Authors' analysis

For the telecommunications industry costs to obtain or fulfil a contract relate to the discretionary renewal bonuses at the renewal date, incremental acquisition costs for renewing contracts, subscriber acquisition costs and deferred customer acquisition costs. Where the disclosure was rated as excellent, management have provided that these costs are incurred specifically in relation to the contracts and therefore are capitalised. These costs are considered recoverable and therefore have been recorded as an asset (contract cost asset) and amortised.

One company included the relevant disclosure upon initial adoption but omitted the disclosure in both years post adoption. Per inspection of the financial statements all of the periods under review have contract cost assets on the balance sheet. For these financial statements a rating below standard has been achieved. This disclosure would be required in order to understand why these costs were capitalised as opposed to being expensed and therefore the limitation of this disclosure reduces the decision usefulness of the financial statements.

Two of the companies within the population do not have contract costs assets reflecting on their balance sheet and therefore no disclosure has been provided relating to the potential costs to obtain or fulfil a contract. In order to enhance the financial information management could provide additional disclosure as to their judgements in determining that there are no costs to be considered or what they have

Table 9 Thematic content analysis of judgements relating to the costs incurred to obtain or fulfil a contract

Year	Rating	IFRS 15.127(a)	IFRS 15.127(b)
Companies within the Telecommunications industry			
Initial adoption	Excellent	4	4
	Standard	0	0
	Below standard	0	0
	Not applicable	2	2
First year post adoption	Excellent	3	3
	Standard	0	0
	Below standard	1	1
	Not applicable	2	2
Second year post adoption	Excellent	4	4
	Standard	0	0
	Below standard	1	1
	Not applicable	1	1
Companies within the Construction industry			
Initial adoption	Excellent	0	0
	Standard	1	0
	Below standard	4	5
	Not applicable	0	0
First year post adoption	Excellent	0	0
	Standard	2	1
	Below standard	3	4
	Not applicable	0	0
Second year post adoption	Excellent	0	0
	Standard	2	1
	Below standard	3	4
	Not applicable	0	0

Source: Authors' analysis

considered. If these costs are being expensed due to the period being less than 12 months this should explicitly be stated as to ensure that the users have a complete understanding of these costs.

Most of the companies within the telecommunications industry provided clear explanations as to how these assets are amortised. This was included in a manner that explained that the asset was amortised using a straight-line or systematic basis over the period of the contract or average customer contract term. The average term considered by management was included in the disclosure and therefore is considered useful in the users understanding of the period applied. Where the amortisation period was considered to be less than twelve months management has included that the practical expedient from IFRS 15 has been applied and the costs have been expensed as opposed to capitalised.

No company within the construction industry received a rating of excellent for IFRS 15.127(a) or IFRS 15.127(b). This was due to disclosures being provided that was seen to be more general in nature and that as the practical expedient is applied no contract cost assets have been recognised. The companies did include that they pay costs to the employees relating to certain types of contracts that they obtain. Additional disclosure as to what contracts the commission is paid could be made so as to enhance the usefulness of the financial statements.

Several companies within the construction industry received a rating below standard where sufficient disclosure was not included regarding contract costs where it would be expected that such costs do exist. It was further noted that there were insufficient disclosure on whether and how the costs were amortised. Even if the companies decided to apply the practical expedient, sufficient disclosure of the fact should have been made.

6 Conclusion

The objective of this paper was to explore the sufficiency of the disclosures made by management, of JSE listed companies, within the telecommunications and construction industry. These disclosures specifically related to the significant judgements and uncertainties made, as specified within IFRS 15. The disclosures have been assessed per the requirements provided in IFRS 15.124 to IFRS15.127 to determine whether all of the disclosures are presented within the financial statements and if they inform useful decision-making among the users of the financial statements.

Due to the complexities identified within the implementation of IFRS 15, the study focused on companies within the telecommunications and construction industry. All (6) of the telecommunications companies listed on the JSE have been included in the study. The selection of the construction companies followed a logical approach. The process isolated the companies within the industrial sector and then further explored to identify the companies that provided construction as part of their main operations. Finally, all (6) of these companies were selected. One of the companies has voluntarily deregistered from the JSE and therefore has not been included in the study for the construction industry. Five companies were therefore included as part of the study.

The investigation identified that the disclosures relating to the judgements and uncertainties are sporadic and inconsistent in how management has applied them. Based on the assessment of the periods under review it can be noted that the disclosures are not consistent year on year. All of the disclosures have been identified as relevant to the construction industry; therefore, no disclosures are considered not applicable. Within the telecommunications industry, two companies have not included disclosure relating to IFRS 15.127. These were considered to be not applicable as there are no contract costs assets for the periods.

Both the results for the telecommunications and construction industry identified that over the period under review, management has increasingly improved the existence of the disclosures and an increase in the required disclosures has been included in the subsequent years. Therefore, upon review of the financial statements, management has improved the financial information, which would improve the usefulness of the disclosures for the users.

The thematic content analysis was performed to assess whether the disclosure made relating to the judgements and uncertainties by management are considered to be excellent, standard, below standard or not applicable. The quality of the disclosures relating to the telecommunications industry have been identified as inconsistent over the periods. When investigating IFRS 15.127, the disclosures fluctuate based on one company including relevant disclosure in the second-year post adoption and one company omitting the relevant disclosure in both years post adoption. This has resulted in the movement in the disclosures classified as excellent for the telecommunications industry fluctuating from 46% during initial adoption to 43% first year post adoption to 46% second year post adoption.

The standard rated disclosure follows an expected trend of improvement year on year. Intrinsically, this results in the expected reduction in the below standard disclosures over the period as the disclosures have been enhanced by management over the periods under review and therefore less disclosures have been rated as below standard.

The construction industry findings have followed the expected patterns in that the excellent and standard disclosures have increased over the periods. Thereafter, the percentage of the population achieving a below standard rating has decreased over the period. This has further evidenced an improvement by management in applying the specified disclosures and enhancing the financial information for the users as to ensure that they are useful for decision making.

Limitations

The companies selected are all listed on the JSE within the construction and telecommunications industry. This scope therefore provides for a limitation of the findings and therefore may not be an accurate representation of other industries such as financial institutions, mining and retail. Additionally, the findings may not reflect that of countries other than that of South African companies (Marx & Van Dyk, 2011).

Future Research

Further research could be performed on companies not listed on the JSE and companies within industries other than the telecommunication or construction industry. This also extends to companies that are not in South Africa. Studies could be performed as to assess the level of compliance of these other companies from an international perspective.

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How Will the Suggested Funding Methods of the South African National Health Insurance Potentially Affect the Individual Taxpayers?

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Abstract The constitution recognises health care as a fundamental right; however, transformation is still required in the health sector. To try and rectify the challenges faced by this sector, the government is therefore proposing the implementation of a National Health Insurance (NHI) that will cover the costs of healthcare for its national population irrespective of their socio-economic status. In doing so, some of the funds to provide to the NHI financial system is theoretically said to come from surcharge of income tax from individuals, introduction of NHI in payroll tax as well as an increase in Value Added Tax (VAT). The increase in these taxes may have a direct or indirect impact on taxpayers. The study design is based on a qualitative methodology and scenario-based approach. The qualitative literature review aims to explore the potential effects of the proposed NHI implementation through the analysis of the impact of increasing VAT. While the scenario-based approach illustrates the impact of the introduction of NHI in payroll taxes as well as the impact of VAT increase on an individual South African taxpayer. The findings suggest that the current South African tax base is narrow and the burden of funding the NHI will add to an already strained tax base. Without these contributions from taxpayers towards the fund, it may not be feasible for the government to implement the NHI.

Keywords National Health Insurance · Funding · Individual tax · Tax base · Health care · Value added tax

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1 Introduction

1.1 Background

According to the Department of Health (2020), the National Health Insurance (NHI) in South Africa has long been a goal of public policy intended to provide universal access to healthcare. In simple terms, the aim of the NHI is to provide good healthcare for all individuals by dividing the money available for healthcare among all individuals residing in South Africa. An individuals' eligibility for health care will no longer be determined by their financial status. Furthermore, the NHI will establish a single public health fund with sufficient resources to effectively prepare for and address the health needs of the entire South African population, and not just a small portion of it.

There has been talks and suggestions in the development and strategic implementation of the NHI in South Africa and several studies including policy papers have been published documenting these developments. An overview of South Africa's NHI's history must be provided in order to comprehend the reasoning for the implementation of the NHI in the country. The historical background of the NHI is provided below.

1.2 Overview of South African NHI

Early Concepts and Policy Changes: The African National Congress (ANC) Health Plan of 1994 is where the concept of a universal health system in South Africa first emerged. Over the years, numerous policy documents and reports have emphasized the necessity of ensuring everyone has access to healthcare and have suggested various methods to do so (Department of Health NHI policy, 2011).

The South African government published the Green Paper on NHI in 2011, outlining the suggested structure for putting universal healthcare into place. It placed a strong emphasis on the values of cross-subsidization, social solidarity, and gradual implementation (Department of Health NHI policy, 2011).

The government launched a number of pilot projects between 2012 and 2019 to test various NHI components, such as contracting arrangements, payment systems, and service delivery models. These pilots were conducted in chosen districts to investigate the feasibility and problems of implementing the NHI in practice (Parliamentary Monitoring Group (PMG), 2020).

PMG (2021) focused on the NHI Bill and the Legislative Process: The NHI Bill was introduced to Parliament by the government in 2019. The law provides the governance, financial, and service delivery frameworks as well as the legal basis for the creation of the NHI Fund. The measure underwent a parliamentary procedure that included committee reviews and public hearings.

According to the National Health Insurance Bill (2019) the NHI's main goal is to fulfill the promise mentioned in the Constitution which state that: "All South Africans should constitutionally be provided access to high-quality healthcare". This study aims at addressing key factors that highlights the impact of NHI funding on a South African individual taxpayer based on the law mentioned above. Therefore, a brief overview of the constitutional right is discussed below as it establishes the measures that government have to adhere to when introducing a new policy that has to be financed.

1.3 Constitutional Right

According to the highest law in South Africa, which is the Constitutional Law, lists the Bill of Rights S27ss (1)(2)(3) in chapter 2. The Bill states that:

1. "Everyone has the right to have access to –
   (a) Health care services, including reproductive healthcare.
   (b) ....
   (c) ....
2. The state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realization of each of these rights.
3. No one may be refused emergency medical treatment."

According to Rautenbach and Malherbe (2003) the bill of rights protects these rights because they are typically violated when people lack or have insufficient access to competent healthcare services. These rights must be protected, promoted, and upheld by the state, and they may not be violated. First and foremost, the rights contain the obligation for the state and everyone else not to obstruct or restrict access to the facilities and services they refer to. Second, the state is required under section 7(2) to safeguard these rights by taking steps to stop outsiders from obstructing access. Thirdly, it is the state's responsibility to uphold rights.

The goal of implementing this NHI is to do away with the current tier system, which favors individuals who have access to healthcare, and the affordability thereof. The implementation should increase everyone's access to high-quality healthcare services and offer financial risk protection from catastrophic medical expenses (Department of Health NHI policy, 2011). To achieve the success of the NHI, there must be a stable financial vehicle which will fund the NHI, as stressed in s27(2) of the bill of rights. Furthermore, s27(2) laid out the guidance that the government should follow when determining which finance vehicle to use and these are: *Reasonable legislation and other measures, Progressive realization and Available resources*. Section 27(2) of the Bill of Rights stresses the different concepts as follows:

- *"Reasonable legislation and other measures"* mean the state must create programs that are cohesive, assign duties and obligations to the various levels of government, ensure that the necessary resources are available, and carry out their implementation in a reasonable manner.
- *"Progressive realization"* refers to the recognition that rights cannot be realized right away but that the state must work as quickly and efficiently as possible to get there.
- "*Available resources"* we imply that the number of resources available will determine how quickly the goal is reached as well as how appropriate the tactics taken will be (Rautenbach & Malherbe, 2003).

As stated in section 27(2) above, resources must be provided in order to achieve the goal of NHI implementation, and the primary resource is financing. The proposed funding methods for the NHI are discussed below.

1.4 Proposed Funding Methods

According to HealthMan (2017) the government released the White Paper on NHI in 2017, which offered a more thorough roadmap for the NHI implementation. A single NHI Fund would be created, according to the White Paper, using funds from increasing several kinds of sources, such as VAT, tax revenue, payroll tax, and perhaps a surcharge on personal income. The government has suggested these prospective sources as a way to help the NHI financial system to generate revenue. An increase in these taxes may have a direct or indirect impact on taxpayers (Businesstech, 2022a, b). This could possibly pose a threat to s27(2) of the bill of rights when it comes to the availability of the resources. Any potential increase in taxes, in which the exact amount is uncertain at the moment, will need to consider applying reasonable measures of the amendments of various taxation systems when implementing those potential increases. The progressive realization element will be realized as the government is planning on implementing the NHI in phases. For the purpose of this present study the funding methods that are focused on, are the increase in VAT and the introduction of NHI in the payroll tax. The following are the reasons why only the above-mentioned taxes were discussed in this study:

i. Both VAT and the new NHI tax directly impact an individual regardless of their social status.
ii. They each had specific proposed percentage increases that the government would need to implement in order to fund the NHI.

2 Literature Review

The South African NHI is a proposed universal healthcare system that aims to provide quality healthcare services to all South Africans (Department of Health, 2020). The funding for the NHI will come from a range of sources, including general taxes, VAT, payroll taxes, and a surcharge on taxable income. The potential impact of these funding methods on individual taxpayers remains a topic of interest among policymakers, researchers, and the public (Department of Health, 2020).

Several studies have been published that discusses NHI, but there is no study that has paid adequate attention to the impact that the proposed NHI funding will have on an individual South African taxpayer that has been found. A study conducted by Masuku et al. (2020) analysed the finance mechanics of the proposed NHI Bill and the implications within the development context. The study found that increasing both income taxes and consumption-based taxes could result in a loss of welfare to society at large because labour will be discouraged from working and the poor will be further disadvantages through increase in taxes such as VAT.

Tu and Turner (2019) concentrated on the opinions of experts regarding the best tax or combination of taxes that the South African government may utilize as a potential source of funding for the proposed NHI. According to their research, an increase in VAT is seen as being justifiable, fair, and efficient, whereas an increase in personal income taxes or the introduction of a payroll tax is not. According to their expert respondents, who included tax professionals and others, a ringfenced fund for NHI would strengthen accountability and prevent funds from being expropriated during the budgetary process.

A study by the Council for Medical Schemes (2019) also analysed the potential impact of the NHI on medical scheme members and taxpayers in South Africa. The study found that the implementation of the NHI could result in a reduction in medical scheme membership and an increase in taxes for individual taxpayers. The study also highlighted the need for a transparent and equitable funding model that considers the socio-economic status of individuals.

In conclusion, the cited literatures reflects that the potential impact of the NHI funding methods on individual taxpayers in South Africa remains uncertain. That is the gap that this present study aims to address. There is therefore a need for this present study to examine the potential impact that the increase in VAT and payroll tax will have on individual taxpayers. The study therefore aims to assist individual taxpayers to have a clear understanding of how the funding might have an impact on them as well as provide valuable insights for policymakers in designing a funding model that balances the need for universal healthcare while avoiding excessive tax burdens on individual taxpayers.

2.1 Research Question and Research Objectives

Health care is acknowledged as a fundamental right by the constitution, but the industry still has to undergo significant transformation. The government is consequently recommending the implementation of a National Health Insurance (NHI), which will cover the costs of healthcare for its national population regardless of their socio-economic condition, in an effort to address the issues this sector is currently facing. In doing so, the government has only suggested potential funding sources but has not clearly demonstrated how these funding methods will impact an individual South African taxpayer. To overcome the identified problem, this study's main objective is to investigate how the suggested funding methods will impact an individual taxpayer in South Africa. The sub-objectives below will lead the research to achieve the main objective of this study:

- Exploring the impact that a potential increase in VAT will have on an individual (previous studies on the increase of VAT from 14% to 15% will be reviewed) in order to understand how the impact of the suggested increase may further affect an individual taxpayer.
- Exploring how the proposed additional payroll tax (Introduction of NHI tax) will impact an individual taxpayer.
- To use scenarios to illustrate the practical impact that the increase in VAT and the introduction of NHI on payroll tax will have on an individual taxpayer.

The following sections discuss the methodology that was followed in this study. The conceptual framework of this present study reviews the suggested funding methods comprising of VAT and its impacts on individuals if increased as well as the introduction of NHI into the payroll tax. Following the conceptual framework, is a fictitious scenario-based approach illustrates the practical impact that these taxes will have on an individual and helps achieve the research objective formulated. A conclusion will be extrapolated from the scenarios formulated and the study's findings will be included as well as the limitations encountered in this study.

3 Methodology

3.1 Research Design

In this study, the combination of scenario-based approach and the qualitative research method is used to identify the effects which the suggested funding methods of the NHI have on an individual taxpayer in South Africa. The section consists of two parts, namely:

- Part A: This sub-section focused on documentary analysis as a form of qualitative research technique. The analysis observed the previous change in VAT and its effect on individual taxpayers in South Africa through reviewing electronic and physical documents such as government policies, programs, initiatives, laws, reputable papers, and other scientific materials. The analyses from these documentary materials then assisted in formulating a scenario that further depicted any changes in the VAT and the impact of the change on an individual taxpayer. However, this approach cannot be used for the introduction of NHI in payroll tax as this is something new that is being introduced in an already existing payroll tax system.

- Part B: This sub-section focused on the scenario-based approach to illustrate the effect which the suggested funding methods of the NHI have on an individual taxpayer in South Africa. The scenario-based approach includes two scenarios based on the two potential funding methods selected for this study, namely: the increase in VAT and the introduction of the NHI in payroll tax.

3.2 Trustworthiness

To define how reliable qualitative research findings are, the words "quality," "authenticity," and "truthfulness" are often employed. It has to do with how much the audience trusts or relies on the results (Brigitte, 2017). Babbie and Mouton (2004) also states that to determine whether a qualitative research study adheres to the theory of trustworthiness, the researcher must demonstrate that the study's findings are credible and deserving of attention. Data was collected using a thorough literature review. The research study intended to protect the reliability of the qualitative data by using government documents and published works from reputable writers or publications that had undergone peer review and been accepted for publication in scholarly journals.

According to Fransworth (n.d.) the true value of qualitative research, or whether the study's conclusions are reliable and accurate, is determined by its credibility. It also depends on the validity of the research methodology. Fransworth (n.d.) further states, to build a framework that can be used to a new set of data for reflection and meaningful comparison, the results from a study must be comprehensive and rich in description. This is known as transferability in qualitative research. In this present study, hypothetical scenarios are used to examine the actual impacts that the tax increases will have on individual taxpayers.

3.3 Ethical Consideration

Ethical principles and policies were applied in analysing and interpreting documents. As all the data used for this research is in the public domain, and the study received the ethical clearance approval from the University of Johannesburg's School of Accounting: Ethical clearance Code is SAREC20230419/09.

3.4 Part A: Documentary Analysis

3.4.1 Introduction

According to Bhandari (2020), a qualitative research methodology is the foundation of the current study. To understand ideas, attitudes, or experiences that underly people's responses to a situation, a qualitative technique is used to collect and analyze non-numerical data. The present study, which aims to comprehend and describe the subject under evaluation, which is the proposed funding of NHI, was conducted using a documentary analysis approach. According to Bowen (2009), document analysis is a systematic technique used for assessing or reviewing documents, both printed and electronic data. Document analysis, like other qualitative research methodologies, necessitates the examination and interpretation of data to extract meaning, gain insight, and develop empirical knowledge. The following documents among others were reviewed: government policies (White Paper, Green Paper, Department of Health, NHI Bill). programs, initiatives, laws, reputable papers, and other scientific materials.

The first sub-objective which is: Exploring the impact that a potential increase in VAT will have on an individual (previous studies on the increase of VAT from 14% to 15% were reviewed) to understand how the impact of the suggested increase may further affect an individual taxpayer, was evaluated using this analysis technique. In employing this methodology technique, the study followed a systematic explanation of the rules controlling a specific legal category, which examines the relationships between the rules, clarifies areas of difficulty, and was based on documentary material. Furthermore, the research methodology used incorporated features of doctrinal research (McKerchar, 2008). To find information pertaining to the proposed NHI funding methods which is, the potential increase in VAT, historical documents, papers, and articles were reviewed. The study's sources were obtained from academic journals, articles, theses and from the government and department of health websites that other authors had also cited in their own research studies. The qualitative analysis includes an overview on VAT and the implications of the increase on an individual taxpayer in South Africa.

3.4.2 Qualitative Analysis

Value-Added Tax

Value-Added Tax is commonly known as VAT. VAT is an indirect tax on the consumption of goods and services in the economy, and it is revenue raised for government (SARS, 2021). According to Go et al. (2005), VAT in South Africa was introduced in September 1991 to replace general sales tax (GST), as this was imposed at a statutory rate of 10%. The rate was then increased to 14% in 1993 and later increased to 15% on the first of April 2018. VAT is currently stated at 15%

in South Africa. The purpose of VAT is to generate revenue for the government, and it does this by mandating a business that engages in trade to register for VAT. In doing so, the business (subject to certain criteria) will charge VAT on supplies of goods and services it makes, on the importation of goods and on imported services. The business will also be allowed to deduct any VAT that was applied to a supply made to it or, in certain cases, applied by a company that is not registered for VAT. VAT is therefore non-cumulative, meaning that a credit/deduction is allowed for VAT paid in previous stages, within the production and distribution chain. If the VAT levied to the business exceeds the VAT charged by the business, the business must pay the difference in VAT or request a VAT refund (SARS, 2021).

VAT is normally split into three different categories namely, Zero Rated charged at 0%, standard rated charged at 15% and exempt that is no VAT is charged. Standard-rated and zero-rated supplies are also known as taxable supplies. Other supplies are known as exempt or non-supplies (SARS, 2021).

VAT is one of the primary sources of revenue for many countries around the world, including South Africa. According to Tax Stats (2022) in the 2021/2022 fiscal year tax revenue collected amounted to R1 563.8 billion, and of that amount VAT was the second highest contributor, contributing 25,0% which equates to R390,895 billion. The South African NHI is a proposed universal healthcare system aimed at providing quality healthcare services to all South Africans. The funding for the NHI is a topic of significant importance, and one of the potential funding methods that has been suggested is an increase in VAT.

VAT is an attractive option for revenue generation due to its broad-based nature and relatively stable revenue stream. However, an increase in VAT can have implications for consumers, particularly those with lower incomes, as it affects the cost of goods and services.

Implications of VAT Increase

According to Businesstech (2021a) additional taxes to fund the NHI will need to be introduced, including the possibility of increasing VAT. 'An increase in VAT will be beneficial for government to function to its maximum capacity because of increased collections that can also contribute to the funding of NHI, but could have a negative impact to the consumers. The VAT increase directly affects the average man on the street—with consumers in the lower income brackets feeling the effects the most (Scjunction.com, 2018). It reduces the disposal income of all South Africans, regardless of whether you are poor or rich.

There are different opinions on what percentage VAT should increase by to cover the NHI costs. According to Bauer (2011), the department's chief director of economic tax analysis and tax policy mentioned in his speech that VAT increase will be justifiable as the current SA VAT tax is lower compared to the worldwide average of 16,4%. Different companies and funds have done their calculations and Solidarity's calculations indicate that the government should increase VAT from 15% to 20%, that is then a 5% increase. According to MMI Holdings (2016), to fund the high estimate of the NHI, a VAT rate of 19,4% is required, therefore that is an increase of 4,4%. For the purpose of this present study a 5% VAT increase estimate was used as it covers most of the predictions that were made by different individuals. Below are the implications that were identified when the South African VAT changed from 10% to 15%.

According to Roos et al. (2019), Gcabo et al. (2019) and Dangor (n.d.), an increase in VAT had various impacts on individuals, some depending on the specific circumstances of each case and below are the common general effects that were identified:

i. Higher prices: When VAT is increased, businesses may pass on the additional tax cost to consumers, resulting in higher prices for goods and services. This can lead to a reduction in purchasing power for individuals who have to pay more for the same products they used to buy.
ii. Inflation: VAT increase leads to higher prices, it can also cause inflation in the economy. This can make it more expensive for individuals to buy essential items such as food, clothing, and housing.
iii. Reduced disposable income: If prices rise due to a VAT increase, individuals may have less disposable income to spend on discretionary items. This can have a negative impact on the overall economy, as consumer spending is a significant driver of economic growth.
iv. Regressive tax: VAT is often considered a regressive tax, meaning that it tends to impact low-income individuals more than higher-income individuals. This is because low-income individuals spend a larger percentage of their income on essential goods and services, which are subject to VAT.
v. Impact on businesses: VAT increases can also have an impact on businesses, particularly small businesses that may struggle to absorb the additional cost. This can lead to job losses, reduced investment, and slower economic growth.
vi. Impact on food choices by consumers: When VAT increases the less fortunate will resort to purchasing and consuming cheap and unhealthy foods, because the food stuff that is currently zero rated are not the most nutritious. The increase on VAT will continue to make access to nutritious and quality food more difficult or unattainable.

Overall, a VAT increase can have significant impact on individuals and the economy. It is important for governments to carefully consider the potential consequences before implementing such a change. Failure to factor in the impact of VAT increase will result in increased levels of poverty, inequality, and increased levels of instability due to hardships experienced by the poor and marginalized.

3.5 Part B: Scenario-based Approach

3.5.1 Introduction

According to Balaman (2018), scenario-based approach involves predicting the expected value of a performance indicator given a time frame, the occurrence of various scenarios, and changes in the values of system parameters that are associated to those situations in an uncertain environment. The study uses disposable income of an individual taxpayer as a performance indicator while increase in VAT and payroll taxes are used as system parameters. The system parameters are uncertain because they are merely suggestions made by scholars regarding potential funding methods for generating NHI revenue (Tu & Turner, 2019).

This study used hypothetical scenarios to illustrate the practical impact that the potential increase in VAT and the introduction of NHI in the payroll tax might have on an individual taxpayer. The study forecasts how the system parameters will impact a taxpayer's disposable income constructed on a scenario-based methodology. Furthermore, this will address with the third sub-objective of the current study.

3.5.2 Introduction of NHI in Payroll Tax

According to Department of Health NHI policy (2011), the government needs to implement different funding methods to generate funds for the NHI and one of the suggested fundings was the introduction of the NHI in payroll tax. Payroll tax is usually referred to as the tax that must be deducted by an employer from an employee's remuneration paid or payable (South African Revenue Service (SARS), 2023). Once the tax is deducted, the employer will pay the funds to SARS and therefore, SARS together with the government will use the funds to finance social security programs. Currently, the South African payroll tax system is structured as follows:

- PAYE (employees' taxes) calculated on the tax tables.
- UIF (unemployment insurance) 1% of the total salaries
- SDL (skills development levy) 1% of the total salaries

The implementation of the NHI in payroll tax will add another type of tax within an individual's current tax framework. The implementation of the NHI will follow a similar structure as that of SDL, in which a fixed portion of the total amount paid in salaries for an individual will be subjected to a contribution at that fixed rate. As stated in the Department of Health NHI policy (2011), the funds generated from this contribution will be used to fund the NHI. This means that individuals will fund the NHI system through their contributions. Although the funds could be said to be sizable and reliable as a source of income for the government, the White Paper warns that this may have a detrimental impact on formal employment and job growth because of the increase in the cost of work (Econex, 2016). In line with this, Goudge et al. (2012), stated that this proposed funding method could be reasonable for the government but the addition of this contribution to an individual taxpayer could be a burden.

According to estimates, if NHI payroll tax is introduced, the amount of NHI contribution in payroll tax that must be collected must be charged at a 5% rate to fund the NHI. Payroll taxes are also progressive, which means that the more money a taxpayer makes, the more tax is due (Tu & Turner, 2019). This proposed introduction is not a new tax base as compared to the surcharge increase in personal income tax, as it will be an addition to the payroll tax structure that already exists. Contrary to the rate mentioned above, Businesstech (2021b) suggested a different rate of 5.5%, to be collected.

According to Bethesda (2010), the introduction of NHI in payroll tax may cause valuable employees to leave the formal sector in order to avoid paying higher payroll taxes, which would have a detrimental effect on production. According to Businesstech (2021b) the government estimate to possibly generate R112 billion in 2026 in the following ways, according to Solidarity's calculations, if the NHI is implemented:

- A 20% income tax surcharge
- A 20% increase in VAT from 15%
- A 5.5% payroll tax
- Corporate income tax was raised from 28% to 42%.
- Any combination of these

Two different rates were suggested by the different authors to fund the NHI using payroll taxes. For the purpose of this present study the 5.5% payroll tax assumption was used because it is inclusive of the 5% that the other author already suggested, and it is supported by numerical values that the government could possibly generate.

A scenario illustrating the potential impact of a payroll tax increase on a South African taxpayer:

Let's consider the case of John, a working professional in South Africa. He is employed as a software developer in a medium-sized IT company and earns a monthly salary of R30,000. John has a spouse who is currently not working, and they have two children.

In this scenario, the government has decided to introduce a new payroll tax as a funding mechanism for the National Health Insurance (NHI). The proposed payroll tax is assumed to be set at a rate of 5.5% of an employee's monthly income.

With the introduction of NHI to the payroll tax, John's monthly salary will be subject to the new tax. Let's calculate the impact:

John's gross monthly salary is R30 000 with the effect of Payroll tax rate of 5.5%. The payroll tax will amount to R1650. After the payroll tax deduction, John's net monthly salary will be reduced by R1 650. Therefore, his salary after taking out the NHI would be R28 350 (R30 000 – R1 650) considering that all other payroll taxes still need to be deducted. The increased payroll tax will further reduce John's disposable income by R1 650 each month. This reduction in income may affect his ability to meet his family's expenses and potentially impact their standard of living.

It's important to note that this scenario focuses solely on the impact of the introduction of NHI in the payroll tax, which was previously not there, and it is an addition to the following components that were initially available which are, PAYE, UIF and SDL on a taxpayer's salary. The broader implications, such as the potential impact on employment levels, business costs, and overall economic dynamics, would need to be considered when assessing the effects of such a policy change.

A scenario illustrating the potential impact of a Value Added Tax (VAT) increase on a South African taxpayer:

Meet Sarah, a middle-income earner in South Africa. She works as a marketing manager in a small company and earns a monthly salary of R25,000. Sarah is responsible for managing her household expenses, including groceries, rent, utilities, and healthcare costs.

In the current scenario, the VAT rate in South Africa is 15%. However, due to fiscal pressures and the need for additional revenue to fund various government initiatives, including the National Health Insurance (NHI), the government decides to increase the VAT rate to 20%.

As a result of the VAT increase, Sarah will experience a direct impact on her everyday expenses. Let's consider her monthly grocery bill, which is typically around R4,000. With the VAT rate increase, the additional 5% would result in an extra R200 in VAT charges on her groceries, totalling R4,200.

Similarly, Sarah's monthly utility bills, including electricity and water, amount to approximately R2,500. The VAT increase would add an extra R125 to her utility expenses, bringing the total to R2,625.

Furthermore, Sarah has private health insurance to cover her medical expenses, which costs her R1,500 per month. However, the VAT increase does not directly affect private health insurance premiums.

Considering Sarah's overall monthly expenses, the VAT increase would impact her budget. The additional VAT charges on groceries and utilities alone would amount to an extra R325 per month. This may seem like a relatively small amount, but over time it can add up and impact her disposable income.

It's important to note that this scenario focuses solely on the impact of a VAT increase on a taxpayer's expenses. The broader implications of a VAT increase, such as its impact on the economy, consumer spending, and business operations, would also need to be taken into account when considering the potential consequences of such a policy change.

4 Conclusion and Recommendations

To address the main objective, the sub-objectives needed to be analyzed and the first sub-objective was: Exploring the impact that a potential increase of 5% in VAT will have on an individual. The documentary analysis approach was applied, this is a technique that reviewed documents that contained the impacts that the past increases of the VAT rates had on the individuals. This was done in order to understand how the proposed NHI VAT funding method might impact the individual taxpayer. The results of this analysis revealed that an increase in VAT would have a significant impact on an individual taxpayer. Furthermore, a fictitious VAT scenario above demonstrated how an increase in VAT directly impacts the costs of goods and services, therefore reducing the disposable income of an individual. The additional VAT charges on groceries and utilities which are the necessities, alone would add an extra amount in a form of an expense per month. As shown in the scenario above, the increase does not seem to be a significant amount but over time, the amount will add up and impact the individual taxpayer's disposable income. As a result, people would be forced to allocate more of their income to necessities. The broader implications of an increase in VAT, such as its impact on the economy, consumer spending, and business operations, would also need to be considered when considering the potential consequences of such a policy change.

The second sub-objective was: Exploring how the proposed additional 5.5% payroll tax (Introduction of NHI tax) will impact an individual taxpayer. Payroll tax is an example of progressive tax and therefore, this means that the higher the individual taxpayer earns, the higher they will pay on their overall taxes. The additional 5.5% of the taxpayer's salary will be an expense that will significantly impact the disposable income of the individual taxpayer. This reduction in the disposable income will affect the individual taxpayers' ability to meet the family's expenses and potentially impact their standard of living.

The third sub-objective was: To use scenarios to illustrate the practical impact that the increase in VAT and the introduction of NHI on payroll tax will have on an individual taxpayer. Both the fictitious scenarios created reflected that the increase in VAT and the additional payroll tax will have a negative impact on the taxpayers' disposable income and therefore affecting their livelihood. Having addressed all the sub-objectives, the main objective being to investigate how the suggested funding methods will impact an individual taxpayer in South Africa was therefore achieved.

To assess the true impact of the suggested funding methods, further analysis is necessary once the South African government provides more comprehensive and detailed information on the specific tax policies and implementation strategies associated with the NHI. The government should be careful when considering implementing the finance vehicle of the NHI being the tax system of payroll taxes and VAT, as the current South African tax base is narrow and the burden of funding the NHI will add to an already strained tax base.

Ultimately, the goal of the NHI is to provide universal access to healthcare services in South Africa. Balancing the financial burden on individual taxpayers with the aim of achieving equitable healthcare access will be crucial in the successful implementation of the NHI.

5 Limitations

As with several frequently cited articles, the research design of this present study presents a number of limitations that future researchers can consider. Firstly, numerous research has been conducted from a qualitative approach and thus, the lack of quantitative methodology poses as a limitation to the present study. Included in the cited research papers are proposed tools in which the South African government can potentially utilize in funding the NHI and thus, the lack of how these proposed funding will impact an individual has not been considered in previous studies.

The literature available may rely on theoretical arguments, expert opinions, or qualitative assessments, rather than extensive empirical evidence. Quantitative studies with comprehensive data on taxpayer perspectives, economic impacts, and healthcare utilization patterns are scarce, making it difficult to draw definitive conclusions. The selected literature may exhibit bias, as it may be influenced by the perspectives and interests of the authors, organizations, or institutions conducting the research. Despite these limitations, the existing literature provides valuable insights into the potential effects of the suggested funding methods for the NHI on individual taxpayers in South Africa. Further research is needed to address these limitations and deepen our understanding of the topic, ideally through empirical studies and ongoing monitoring of the policy implementation.

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A Systematic Literature Review on the Impact of Cybersecurity Threats on Corporate Governance During the Covid-19 Era

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Abstract When the Covid-19 pandemic erupted, many companies faced unprecedented challenges, including cybersecurity threats due to increased dependence on technology. Cybersecurity refers to the set of security measures that can be taken to protect cyberspace and user assets against unauthorized access and attacks. It has always been a challenge that has affected the company's existing corporate governance and compliance process. However, during the Covid-19 period, cyber-attacks and dangers increased significantly, posing a new set of challenges to the companies, which in turn had a negative effect on the economy. The purpose of this study was to provide a comprehensive Systematic Literature Review (SLR) on the effects of cybersecurity threats on corporate governance during the Covid-19 pandemic and to identify the existing literature review gaps as well as the challenges and recommendations on how to deal with the identified threats. A preferred reporting item for systematic and meta-analysis-based reviews (PRISMA) was conducted manually on 18 sampled publications. This study utilized a qualitative approach to review published research on corporate governance and cybersecurity threats during the Covid-19 era. The findings revealed that during the Covid-19 period, increasing cyber-attacks were carried out against many companies. The study also revealed that social distancing requirements forced most company directors to review corporate information and participate in sensitive discussions online in their homes or places far less secure than the director's typical business office or company boardroom. As a result, the increased volume of work being performed remotely presents opportunities for cybercriminals to tailor and retool schemes to target directors and those in charge of the company's corporate governance. This study could significantly contribute to the body of knowledge by highlighting the potential challenges cybersecurity as well as the suggestion on how companies could minimize the risks encountered.

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1 Introduction

According to Perwej et al. (2021) the internet has recently started to play a bigger role in people's daily lives all across the world. Before the pandemic, most businesses did not allow their staff to work from home, and most board meetings were held in person. On the one hand, shifting from a stationary to a remote working environment requires companies' boards to pay more attention to the wave of potential cybersecurity attacks and incurring additional security costs (Antczak, 2022). Cybersecurity refers to "the methods that organisations uses to safeguard its products and information in cyberspace" (Perwej et al., 2021, pp. 669). During the Covid-19 era, many companies were confronted with unprecedented challenges, including those associated with cybersecurity threats due to increased dependence on technology (Soni et al. 2020). There are practices that were introduced during this era, such as lockdown and social distance. As a result, most employees were required to work remotely, resulting in many organisations relying significantly on technology.

The primary threat to systems from cyber-attacks is the online interactions of organisations, making it a challenging effort to defend them (Khan et al., 2020). Most executive staff working from home used various technologies to process, access, or transmit company documents or information, making it challenging to protect the corporate governance principles. Therefore, this made it easy for the cyber criminals to hack onto the systems to access the confidential information of these organisations (De et al., 2020; World Health Organisation [WHO], 2020). As cybercriminals exploit social flaws, cyber-attacks increased significantly during the Covid-19 pandemic (Alawida et al., 2022). The World Economic Forum (2019) defines cybercrime as malicious computer-mediated access to an entity or someone's information. System interference, forgeries, and identity theft are some prominent kinds of cybercrimes (Alawida et al., 2022; Duong et al., 2022). The rise in cybercrime has exposed the lack of cyber-skilled professionals in most countries (Peter, 2017). Due to a global shortage of qualified cybersecurity personnel, cybersecurity concerns exist today (Blažič, 2021).

Many variants of cyber-attacks occurred and identified during the global crisis caused by Covid-19 include "phishing, malware, distributed-denial-of-service (DDoS), denial-of-service (DoS), advanced persistent threat (APT), malicious social media messaging (MSMM), Business E-mail Compromise (BEC), botnet, ransomware amongst many others" (Auyporn et al., 2020; Babulak et al., 2020; Bossler, 2021; Alawida et al., 2022).

Everything has recently been converted to digital, and cybernetics uses a range of technologies, including cloud computing, smartphones, and Internet of Things techniques, among others. People use the Internet to purchase goods and services and other e-commerce activities (Alawida et al., 2022). Cybercriminals, on the one hand, have redefined their targets and the types of cyber-attacks (Antczak, 2022). Poor data management practices and unchecked system controls within organisations are some of the contributors to cybersecurity risks (Abukari & Bankas, 2020). Company executives from different industries face a rapidly changing cyber-threat environment (Antczak, 2022). Thus, companies had to significantly improve their cybersecurity in order to keep up with the rapid changes in cyberspace presented by Covid-19. Directors who are in charge of the organisation's governance were required to conscientiously protect the confidentiality of the organisation's information despite the unprecedented disruptions caused by Covid-19. Good corporate governance and record-keeping are essential, especially in more challenging times such as the Covid-19 era. However, according to a survey by the Global Risk Survey approximately 79% of the board of directors indicated that their companies were not sufficiently prepared to deal with Cybersecurity threats on corporate governance.

Company records communicated through communication platforms such as Zoom or chat applications risk becoming subject to cyber-attacks (Chigada, 2020). In addition, board members have a fiduciary duty to maintain corporate confidence (Goldberg, 2020). A breach of the fiduciary duty of confidentiality could expose directors to personal liability.

In light of the above, this study aims to answer the following question: What are the effects of cybersecurity threats on corporate governance during the Covid-19 era? Moreover, this study provided an in-depth review of the related literature on the cybersecurity threats on corporate governance and provided suggestions on how organisations can alleviate the challenges encountered. Furthermore, the research elaborated on the gaps existing in the literature. The following objectives were formulated to answer the abovementioned question.

1.1 Objectives of the Study

The following objectives were developed to provide a comprehensive Systematic Literature Review (SLR) on the effects of cybersecurity threats on corporate governance during the COVID-19 era:

- To identify the cybersecurity issues organisations faced during the Covid-19 pandemic;
- To determine the impact of the cybersecurity on the threats posed by the Covid-19 pandemic; and
- To provide possible ways for mitigating the threat that cybersecurity poses to businesses.

As depicted in Fig. 1, the most prevalent threats to cybersecurity were identified.

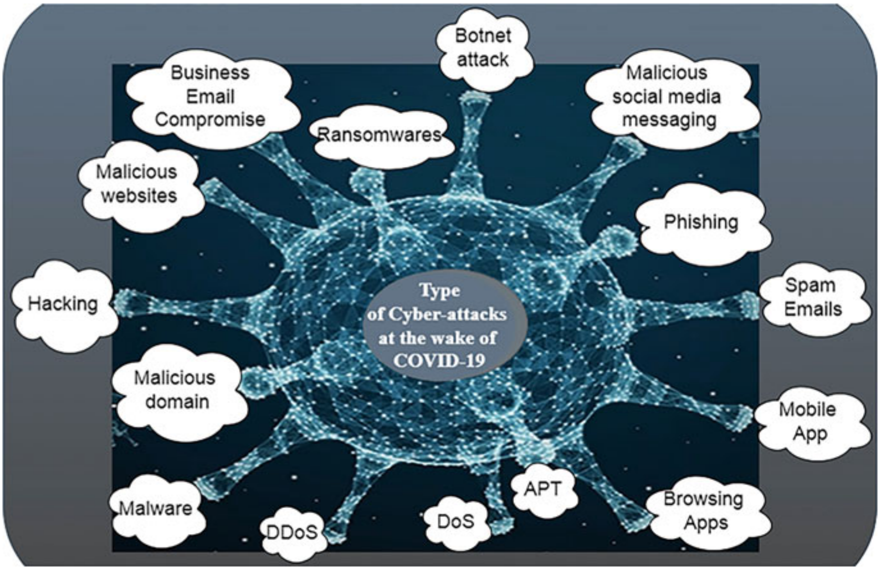

Fig. 1 Principal threats to Cybersecurity following Covid-19. Source: Alawida et al. (2022)

2 Methodology

This study used a qualitative method to review published research on corporate governance and cybersecurity threats during the Covid-19 era. A systematic literature review was performed using the PRISMA guidelines. PRISMA is a widely accepted guideline for systematic reviews and fits the current study's purpose. The use of SLR approach helps to correlate and draw conclusions from different sources on cybersecurity threats. Moreover, in the wake of Covid-19, researchers in the field of cybersecurity frequently employed the systematic review approach to carry out their studies (i.e. Alawida et al., 2022; Luhar et al., 2022; Perwej et al., 2021; Hazaa et al., 2021).

2.1 Keywords and Terms Identification

Methodologically, this study begins by searching various databases for publications that examine the overall ontology between cybersecurity and corporate governance in the Covid-19 era. Keywords and terms identifications, including bibliographical databases, were explored to facilitate the extraction of publications. This step assisted the researchers in identifying relevant publications from different search engines. For example, to ensure that the relevant literature was attained, the following keywords were included as part of the search titles 'Covid-19 and cybersecurity', 'and 'corporate governance', 'the cybersecurity threats during the Covid-19 era', and 'corporate governance and Covid-19′.

2.2 Inclusion and Exclusion Criteria

Using the following inclusion and exclusion criteria, as shown in Table 1, articles were chosen for inclusion in this study.

2.3 Data Sources and Search Strategy

The literature search was conducted between December 2022 and the beginning of January 2023. The search was limited to journal articles, conference papers and book chapters published between 2020 and 2023. According to Sect. 3.2, specific keywords were used in the search. The databases consulted include Google Scholar, Science Direct, IEEE Xplore, Springer Link, Sabinet, Elsevier, Emerald Insight, Willey, and EBSCOhost. There are lots of available literature sources on these databases and RISMA recommended a search from this database to enable accurate data sources.

At the initial stage, the search process produced 55 publications, including journal articles, conference papers, book chapters, and website documents. The researchers evaluated the Abstracts of each publication and categorized them as either included or excluded for this study to ensure that relevant literature was included. The current investigation deemed 12 research publications relevant, reliable, and also acceptable for this study. The results of the search process are presented in Tables 2 and 3 below. The flow diagram based on PRISMA guidelines is shown in Fig. 2.

Table 1 Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Published during and after the Covid-19 pandemic (2019–2023)	Published before the Covid-19 pandemic
Empirical research	Studies that are not empirical research, such as reviews
Written in English	Studies not written in English
Involves sample from an organisation	Studies not related to an organisation
Publications in journals, conferences, and book chapters	Publications that were replicated, as well as those related to epidemiology

Table 2 Summary of search results

Search results	Number of publications	Exclusion from the current study	Inclusion in the current study
Journals	33	25	14
Conferences	10	7	3
Book chapters	6	5	1
Websites	6	6	0
Total	55	43	12

Source: Authors own construction

3 Result and Discussion

This section presents the findings of the study.

4 Cybersecurity Concerns Faced by Companies During the Covid-19 Pandemic

It was found that during the Covid-19 era, increasing cyber-attacks were carried out against many organisations. This was because more sensitive business information was exchanged electronically as a result of the change in working patterns from physical to remote. These motivated cybercriminals to increase their online criminal activities. Africa has been one of the continents where cybercrime activity has grown at the fastest rate (Kshetri, 2019). A week after the Covid-19 pandemic began, 310,000 devices, the majority of which were used for business purposes, were the target of cyber-attacks, to steal user credentials like passwords for use in unauthorized access to sensitive data held by entities (Prior, 2020). South Africa had the third-highest number of victims of cybercrime worldwide due to a lack of cybercrime laws and a failure to integrate technology (Koigi, 2020). Each sector was affected differently by cyber-attacks, which caused 36% of South African companies to lose income and 27% to suffer reputational harm (FTI Consulting, 2020). Financial institutions, research, health, and government institutions are some of the most targeted Cybersecurity concerns for businesses due to their intense focus on the disease (Chigada & Madzinga, 2021).

4.1 Financial Institutions

Due to their market dominance in terms of clients and their economic impact on financial markets, banking, digital aspects, and international connections, financial institutions continue to be a high target for cybercriminals (Chigada & Madzinga,

Table 3 List of reviewed studies

Author	Country	Title	Cybersecurity threats presented by the Covid-19 pandemic	Measures that can be put in place to reduce the risk of Cybersecurity
AbukariandBankas (2020)	Ghana	Some Cybersecurity Hygienic Protocols for Teleworkers In Covid-19 pandemic Period And Beyond	Spreading of computer-related malwares, online bullying, unauthorised electronic transactions, child pornography and breach of privacy are some of the activities performed by cybercriminals.	Hygienic protocols that can assist in addressing the dangers of cybercrime in the era of COVID-19are presented in the paper.
Alawida et al. (2022)	United Arab Emirates/ Nigeria	A deeper look into Cybersecurity issues in the wake of Covid-19: A survey	During the Covid-19crisis, 15 distinct types of cyber attacks were identified, along with their most common pattern and devastating events.	In order to overcome the effects of the pandemic or other crisis of a similar nature, the study suggests that governments and organisations make decisions regarding Cybersecurity that are innovative and resilient
Alkhalil et al. (2021)	United Kingdom	Phishing Attacks: A Recent Comprehensive Study and a New Anatomy	Theft of private information, business secrets, and government secrets are just a few of the significant losses that victims of phishing attacks can sustain.	The anatomy that is being proposed will assist in raising awareness of these phishing attacks and the methods that are utilised. Additionally, it aids in the creation of a comprehensive anti-phishing strategy. In addition, new approaches are suggested, and some precautionary measures are investigated.
Blazic (2021)	Slovenia	The Cybersecurity labour shortage in Europe: Moving to a new concept for	These results indicate that Cybersecurity topics are not covered in	Based on our findings, the emerging educational landscape is

(continued)

Table 3 (continued)

Author	Country	Title	Cybersecurity threats presented by the Covid-19 pandemic	Measures that can be put in place to reduce the risk of Cybersecurity
		education and training	private courses or Cybersecurity programmes offered by higher education institutions.	proposed, and the steps taken to improve education in both sectors are presented. In the concluding section, recommendations for improving Cybersecurity education and training are provided to stakeholders and academics.
De et al. (2020)	India	Impact of digital surge during Covid-19 pandemic: A viewpoint on research and practice		Aspects of surveillance and privacy gain importance with increased digital usage.
Duong et al. (2022)	Australia	Working from home users at risk of Covid-19ransomware attacks	The six attack vectors—social engineering, phishing, trojan, remote desktop protocol, drive-by download, and malvertising—are necessary to spread the dangerous malware (ransomware).	The study recommended that future work focus more on teaching and educating working-from-home users about the dangers of ransomware attacks and how to mitigate such an event from occurring.
Hakak et al. (2020)	Canada/ Saudi Arabia/ USA	Have You Been a Victim of Covid-19-Related Cyber Incidents? Survey, Taxonomy, and Mitigation Strategies	This study explored Covid-19-themed cyberattacks and categorised them into four categories: disrupting services, financial gains, information theft, and fearware, and further categorised into sub-categories	These categories were used in this study to present potential solutions for mitigation. In the event of future pandemics, the cyberattack taxonomy and potential mitigation strategies can also aid in planning

(continued)

Table 3 (continued)

Author	Country	Title	Cybersecurity threats presented by the Covid-19 pandemic	Measures that can be put in place to reduce the risk of Cybersecurity
			(e.g., malware, ransomware, phishing).	cyberattack prevention efforts.
Khan et al. (2020)	Malaysia	Ten Serious Threats to Cybersecurity During the Covid-19 pandemic.	The registration of spam e-mails, malicious websites, and domains has significantly increased. Individuals, government officials, and even medical and healthcare systems are being targeted by intruders.	In order to alleviate serious privacy concerns and improve the situation surrounding the Covid-19 pandemic, this paper identified Cybersecurity threats that must be avoided.
Kshetri (2019)	United States of America	Cybercrime and Cybersecurity in Africa		Numerous countries on the continent have developed legislation and strengthened enforcement measures to combat cyberthreats, according to the study, which reported a number of measures taken to address cyberthreats and improve Cybersecurity.
Uchendu et al. (2021)	United Kingdom	Creating a culture of Cybersecurity: Future requirements and current practices	The study provides an up-to-date description of the field and identifies unresolved issues that require further investigation, such as the significance of national culture and change management processes in an organisation's Cybersecurity culture.	We have been able to discover the advancements and difficulties currently faced in the field by investigating Cybersecurity culture, including information security culture and security culture.

(continued)

Table 3 (continued)

Author	Country	Title	Cybersecurity threats presented by the Covid-19 pandemic	Measures that can be put in place to reduce the risk of Cybersecurity
Zahra et al. (2022)	India/ United States of America	Detecting Covid-19chaos-driven phishing/malicious URL attacks by fuzzy logic and data mining-based intelligence system	The Covid-19 pandemic altered our way of life and led to a widespread shift to digital platforms as businesses virtually eliminated in-person experiences. However, this change also increased people's susceptibility to cybercrime.	The study offers a thoroughly researched set of mitigation strategies which can be employed to prevent the attacks. It also proposes a fuzzy logic and data mining-based intelligence system for detecting Covid-19 themed malicious URL/phishing attacks.

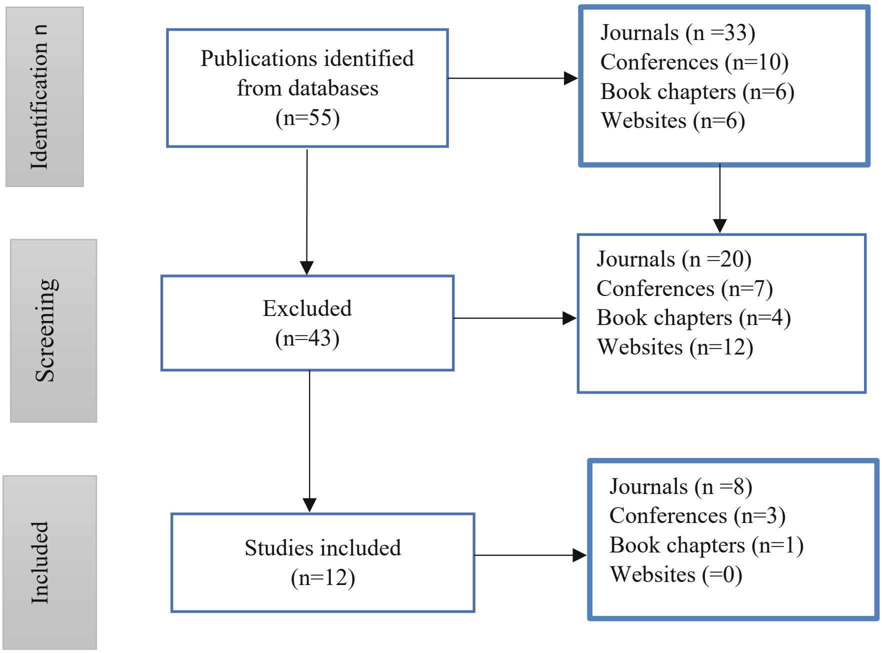

Fig. 2 PRISMA flow diagram. Source: Authors own construction

2021). According to PricewaterhouseCoopers [PWC] (2020) the banking industry is mainly affected by ransomware cybersecurity threats, which have increased more than nine times in South Africa since the beginning of the Covid-19 outbreak. The cause of the rise in cyber-attacks on financial institutions is the heavy reliance on digital applications rather than in-person attendance at financial branches to conduct financial operations (Chigada & Madzinga, 2021). During the first three months of the Covid-19 pandemic, concerns about cybersecurity increased by 238% worldwide due to sudden changes in working procedures and a lack of awareness of technical applications like firewall defences and ongoing virus updates (Chigada & Madzinga, 2021).

4.1.1 Healthcare and Research Institutions

The primary sources of updates and news on Covid-19 are among the front-line institutions, such as research laboratories, hospitals, and pharmaceutical companies. Cybercriminals target these groups to frighten the public and spread panic, so they may devise cunning ways to commit fraud such as identity theft (Chigada & Madzinga, 2021). The authors revealed various reasons which result in these fraud which includes, obsolete software, weak legislation, and a lack of digital literacy, influenced attacks on medical and scientific organisations. It appears that to help curb the spread of Covid-19, healthcare professionals had to rely heavily on e-healthcare services. As a result, the e-mails and passwords of more than 450 healthcare workers were made public (WHO, 2020).

According to a study by Chigada (2020), healthcare institutions are particularly vulnerable to cyber-attacks and threats because they collect and maintain sensitive patient data that cybercriminals can utilise. Medical data protection should be treated carefully, according to Chigada (2020), as it is a target for cybercriminals. Hackers install ransomware to prevent users from accessing their data or operating systems until some kind of ransom is paid to the hackers.

It is important to remember that ransomware can also attack PCs, servers, cloud-based file sharing, and other devices, severely disrupting an organisation's fundamental operations. Businesses could be destroyed by ransomware. If malware prohibits consumers from accessing data for one day, businesses' revenue will suffer. The most typical means of ransomware distribution are malicious attachments in phishing e-mails that encourage downloads. According to reports, ransomware affected some businesses in 2021, including Acer, Accenture, Kia Motors, CNA Financial Corp., etc. The fact that businesses would prefer not to report an infection owing to possible legal implications and brand damage is known to cybercriminals. In conclusion, businesses should utilize a trustworthy multilayered security solution because it is virtually hard to decode the files that are being held for ransom without having access to the private key. The study concludes that certain businesses are failing to manage the risks due to the substantial increase in dangers brought on by the Covid-19 pandemic's progression.

4.2 Government Institutions

Hakak et al. (2020) mention that government officials used Zoom and other official video conferencing programmes for their meetings, which escalated cyber-attacks due to the services vulnerabilities and made them popular among cybercriminals. The introduction of the R500 billion government stimulus package, which is also covered by the corruption the nation is fighting, was one of the other elements that led to the attacks (Chigada & Madzinga, 2021). Cyber-attacks had a significant negative impact on several governmental organisations, notably Transnet. Moyo (2021) claims that the Transnet IT networks have been modified, disrupting regular business in order to give hackers unrestricted access to the operations of such companies, causing irreparable harm to government bodies.

Due to the growing threat of cybercrime, most South African firms are in a dire dilemma. Growing worries about cybersecurity are putting both people and companies at risk. The biggest consequences include reputational damage that lowers a company's client base and revenue. Companies that lag in technological and computer security advancements suffer the worst outcomes. Cybercriminals regularly take confidential information from companies and use it as leverage to obtain favours from those companies. If South African businesses are to overcome their concerns about cybersecurity, cybercrime must be viewed as a distinct pandemic. This will raise awareness of cybersecurity offenses' risks and damage to everyone interested in the nation, from citizens to high government officials. This will ensure that the right policies and laws are quickly devised and thoroughly implemented, and that compliance is ensured to battle the cybercrime epidemic. The study concludes that South African organisations continue to face severe cybersecurity risks and concerns as a result of their organisation's lack of technological advancements and skilled technical personnel to handle cybersecurity challenges.

5 Cybersecurity's Impact on the Threats Posed by the Covid-19 Pandemic

Cybersecurity prevents virtual assaults on systems, networks, and software (Khan et al., 2020). In order to ensure information integrity, confidentiality, and availability, information systems must be safeguarded against unauthorised access, disclosure and destruction. Lack of adequate cybersecurity can harm an organisation's brand, result in financial loss, and negatively impact its operations. The common cyber threats and attacks that harm businesses are depicted are set out below:

5.1 *Malware Cyber Attacks*

Any threat to business systems and personal internet-connected gadgets is malicious malware Ganiyu and Jimoh (2018). Cybercriminals employ malware to infect computers and use them to mine bitcoin, steal financial data, fool victims into supplying personal information, and take over several machines to perform denial-of-service assaults (Alkhalil et al., 2021). In addition, Malware can cause data leaks, and malfunctioning corporate systems can stop operations. As a result, several sizable websites have promoted themselves as tools that protect users from COVID-19.

5.1.1 Business e-mail Compromise Threat

Numerous individuals worldwide have been impacted by Covid-19, which cybercriminals have routinely exploited to taint corporate e-mails. Hackers have recently been found to have compromised business e-mails (Zahra et al., 2022). Zahra et al. (2022) add that hackers frequently target personal information held by financial organisations. By sending phishing e-mails that deceive recipients into providing their personal information.

5.1.2 Ransomware Cyber-Attacks and Threats

Cook (2020) asserts that because employees may access corporate networks from home, hackers can afford to lock users out of their systems and assume that firms will agree to pay a ransom in exchange for their access. Accessing corporate networks from home is regarded as dangerous due to its manual targeting and frequent use in multistage attacks inspired by Emotetmalware (malicious links) and tricot malware (Cook, 2020). Additionally, ransomware refers to encrypting data so that it cannot be later decrypted using passwords (Khan et al., 2020).

5.1.3 Impersonating Websites

To persuade naïve internet users to share vital information, more than 86,000 fake websites with information regarding Covid-19 have been created (PricewaterhouseCoopers [PwC], 2020). Users and businesses have encountered the black NET RAT, a malware that facilitates the start of cyber-attack by loading remote files (WHO, 2020). It is possible for cybercriminals to legitimately acquire a certificate whose domain name contains a specific character that would deceive all commonly used browsers into thinking it is an attacker (PwC, 2020). Attackers ask certificate authorities to issue certificates for subdomains of malicious websites, and since the hacker legitimately controls the parent domain, certificate authorities issue certificates for the domain (Bayhack, 2020). Attacks that mimic other websites can boost the return on investment for cybercriminals.

5.1.4 Mobile Threats and Browsing Applications

Due to the boom in smartphone use, cybercriminals now have more opportunities. The overuse of mobile devices by people allows cybercriminals to produce bogus software that deceives consumers. Cybercriminals recently created a mobile app called Covidlock and falsely claimed that it was derived from an Android app in order to follow Covid-19 cases (WHO, 2020). Many people use unsafe public networks to look up information on company servers. Since hackers can simply access this public Wi-Fi hotspot and infect users with malware, users are exposed to attackers (Abukari & Bankas, 2020).

5.2 Ways for Mitigating the Threat That Cybersecurity Poses

End-point security, network security, content inspection, and other measures have been used to lessen cyber-attacks. Thaldar and Townsend (2021) affirm that the Protection of Personal Information Act aims to protect individuals from harm by safeguarding their personal information in order to prevent the theft of their money, their identity, and, more generally, their right to privacy, which is a fundamental human right. To do this, the legislation specifies the circumstances under which it is acceptable for someone to process another person's personal information. Zahra et al. (2022) state that some precautions taken to stop ransomware attacks included not opening e-mails from unknown senders and requiring encryption to be turned on or installed on all computers. To prevent unauthorised access, a robust multi-factor authentication procedure should be implemented. A plan was put forward by Alkhalil et al. (2021) to lessen the likelihood of password guessing. The method has been shown to be highly secure. It employs BAN-logic to offer manual authentication. Ganiyu and Jimoh (2018) observed that malware is a hazardous programme that a Winlocker can eliminate. Winlocker is a mechanism that most banks are still educating their customers on as it is intended to lock users out of a compromised machine or device (Fenwick et al., 2019). This suggests that as soon as the hacker enters their credentials, Winlocker will capture the hackers' identities.

The steps taken to reduce cybersecurity risk appear to be somewhat successful. However, there may be room for improvement, and some measures may not be all-inclusive. Cybercriminals will not be able to access the private data of companies because the machines they utilise are encrypted, preventing any unauthorised access. Employees would comprehend and be aware of how to handle some cyber-attacks they may encounter using security awareness programmes. Although some may argue that awareness campaigns are insufficient, stakeholders should be encouraged to use the code of conduct and pertinent measures that discourage unethical behaviour. It is crucial to remember that unsecured Wi-Fi must never be used. In order to attempt and limit the harm cybercriminals might cause the firm, the stakeholders must develop security awareness programmes and adhere to the code of conduct. The study's conclusion highlights the necessity for businesses to work together to combat the emerging Cybersecurity pandemic.

6 Conclusions and Recommendations

Since most people were working from home and utilising unsecured internet websites, the study indicated that the rate of cybercrime surged significantly during the Covid-19 pandemic. Additionally, it was discovered that different businesses attempted but failed to use malware software to reduce the danger of cybersecurity for confidentiality purposes. In order to ensure that systems and procedures are regularly updated, it is advised that organisations have the required IT-protected structure in place at the workplace.

Establishing ongoing cyber-security frameworks for financial institutions are advised to help identify suspect sources and electronic activities early. Organisations should establish a standard for implementing new technologies and devices, test IT systems to find weaknesses, and assess cybersecurity measures routinely. By strengthening the rules governing cybercrime and giving more authority to the agencies in charge of investigating and prosecuting cybercriminals, the government can raise its awareness of cyber-attacks. However, this is insufficient given the strategies criminals continue to develop to circumvent the law. The healthcare, financial, and other organisations fighting cybersecurity issues should consider educating and raising citizens' understanding of cybersecurity issues and expanding international cooperation in this fight. Globally, nations should create a strategy to coordinate their responses to cyber-attacks by exchanging information and working with international organisations.

The first step in combating cybersecurity risks should be regularly updating an organisation's cybersecurity policy and ensuring all employees and clients have access to adequate information about the issue. In addition, companies should ensure that their software and operating systems, and those of their employees and customers, are regularly updated. They should also implement password controls and launch education campaigns to inform stakeholders about cyber threats and countermeasures. Furthermore, South African businesses must use emerging technologies and data analytics to reduce their technological weaknesses and withstand cybersecurity threats. Additionally, it is advised that companies hire competent and experienced personnel because South African businesses lack these professionals.

The study recommended that directors conscientiously satisfy their confidentiality obligations despite the unprecedented disruptions caused by Covid-19. This study further recommended that boards of directors comply with the code on corporate governance, such as King IV report, especially on technology and information governance requirements. Finally, this study suggests that company directors must view cybersecurity as a risk management issue affecting the entire organisation rather than just technology.

This study aimed to provide a comprehensive Systematic Literature Review (SLR) on the effects of cybersecurity threats on corporate governance during the Covid-19 pandemic. The introduction served as the foundation for achieving the study's objective. The research objectives that guided the study were derived from the research question. Section 2 of the article discussed the research methods and material comprising a systematic review using a preferred reporting item for systematic review (PRISMA). Section 3 provided the discussion of the results. Lastly, recommendations, as well as future research suggestions were provided.

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The Use of Business Bootstrapping as a Tool for Improving the Performance of SMMEs in Incubators in South Africa

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Abstract This study examined the use of business bootstrapping to improve the performance of SMMEs in incubation on the backdrop of intense competitive pressure in the South African business environment that hampers the competitiveness of businesses, particularly during their initial years of operation. This fierce competitive force also poses a significant threat to the survival of businesses in South Africa during their early stages. Literature reveals a high failure rate among most businesses during their first years of operation, which can be attributed to poor accessibility to capital and a deficiency in business skills. A mixed-method approach incorporating qualitative and quantitative methods was adopted for this study. Qualitative data were analysed using content analysis, while questionnaire responses were analysed using SPSS. The method facilitated a comprehensive understanding of the relationship between a deficit in business skills and the competitiveness of businesses in their early years, leading to the development of the Business Bootstrapping tool. Empirical studies and findings were integrated to bridge the identified research gap and construct the Business Bootstrapping tool designed to ensure the survival of businesses during their initial years of operation. The Business Bootstrapping Model serves as a determinant in overcoming financial and liquidity constraints faced by businesses in South Africa during their early stages.

Keywords Accessibility of capital · Financial · Marketing · Deficit · Business model

1 Introduction

Small Medium Micro Enterprises (SMMEs) serve as society's primary drivers of job creation, accounting for about 60 to 70 percent of the global labour force and source of raw materials for large companies (Obokoh, 2008; Fatoki, 2014). Kalane (2015) further asserts that SMMEs significantly accelerate industrialisation, especially in

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emerging economies, by identifying market failures in crucial sectors. Industrialisation through SMMEs contributes to developing and enhancing various sectors, particularly economic comparative advantage. However, the Global Entrepreneurship Monitor (2016) highlights developing countries such as South Africa experience high rates of SMMEs failures, particularly in the initial years of operation. Minister of Trade and Industry in South Africa, as Cant and Wiid (2016) mentioned, states that over 70 percent of emerging businesses fail within the first years of operation. These survivalist businesses continue to stagnate due to domestic and global competitive pressures. Msimango-Galawe and Hlatshwayo (2021) state that the vulnerability of businesses to domestic and international competitive dynamics during their early years in South Africa has led to the establishment of business incubators in the past two decades. These incubators aim to increase emerging businesses' survival and success rates and, consequently, reduce the failure rates of SMMEs in the country. However, Schutte and Barbeau (2022) argue that the effectiveness of incubator programs has yet to yield the expected outcomes, and the failure rate of SMMEs in South Africa remains relatively high. The study critically reviews the deficiency of business skills in relation to competitiveness and the identification of skills that are significant to SMMEs' survival in South Africa. The study's objective was to develop a business tool to enhance the competitiveness of SMMEs within incubators. This business tool determines overcoming the financial and liquidity constraints SMMEs face in South Africa.

2 Literature

The National Small Business Act (no. 102 of 1996) defines a small business as "any entity, regardless of whether it is incorporated or registered under any law, primarily consisting of individuals engaged in small business activities in any economic sector or established to promote the interests of or represent small business concerns." The number of SMMEs in South Africa increased from 2.23 million in the first quarter of 2016 to 2.48 million in the first quarter of 2017, representing an 11.2 percent year-over-year growth, as reported by Small Enterprise Development Agency (2017, p. 3). Additionally, SEDA (2017) reported, the SMME sector's contribution to South Africa's economy in terms of revenue and spending rose from 37 percent in the first quarter of 2016 to 41 percent in the first quarter of 2017.

2.1 SMME's Role in the South African Economy

Small Enterprise Development Agency's (2017) reports, the SMME sector has played a significant role in job creation, providing employment opportunities for an additional 10.6 million people. Most of these jobs were created in the formal sector, although the contribution to the overall employment percentage declined slightly from 58.7 percent in 2016Q1 to 57.6 percent in 2017Q1. The informal sector has made the most significant contribution to employment growth, while SMMEs in agriculture and private households have experienced some job losses (SEDA, 2017, p. 12).

2.2 Role of the South African Government on SMMEs

Department of Small Business Development (DSBD) indicates the South African government established the Department of Small Business Development in 2014 during the 2017/18 fiscal year. The department's core mission is to promote entrepreneurship, mobilise resources, and facilitate the growth of competitive and sustainable small enterprises and cooperatives. The DSBD conceptual framework aimed at addressing various challenges faced by the SMME sector in South Africa. These challenges include a fragmented business environment, inadequate support for the SMME sector, limited availability of specialised and intensive support, high failure rates among SMMEs, underperformance compared to other developing countries, and the need for enhanced collaboration with government decisions regarding economic transformation.

2.2.1 Government Agencies

Agwu and Emeti (2014) assert the South African government has established various incubation programs through the Department of Trade and Industry (DTI) to support the development of SMMEs and address significant barriers that pose threats to their survival. The Global Entrepreneurship Monitor (2016) also highlights the need for more marketing of incubation programs, making it difficult for SMMEs, especially emerging businesses in South Africa, to thrive in their early years of operation. Marín-Idárraga and Cuartas-Marín (2013) further note that many SMMEs need to be aware of the available assistance, and government agencies tend to prioritise existing businesses over emerging ones Agwa-ejon and Emeti (2014) provides more detailed insights into the effectiveness of government agencies, pointing out their complexities and insufficient staff qualification. Nkwinika (2019) suggests that business incubators may have little impact on the survival of SMMEs, particularly during the initial years of operation in South Africa. Factors such as business size, market sector, and level of innovation also play a role in determining the ability of SMMEs to survive.

2.3 SMME Challenges

Global Entrepreneurship Monitor (2016/2017) articulates that more than 50 percent of SMMEs in South Africa, particularly emerging micro-businesses, faced moderate to intense competition. Global Entrepreneurship Monitor (2015/16) reports, around 57 percent of these businesses reported experiencing such competition, with approximately six percent being highly distinguished from their competitors, indicating that 43.3 percent of businesses had no competitors offering the same competitive offerings. The intensity of competition, combined with issues such as inadequate access to capital and a deficiency of business skills, has harmed the country's industrialisation effectiveness.

2.3.1 Inadequate Finance

The survival of SMMEs, especially fledgling businesses in their initial years of operation, is hindered by a lack of financial resources (Obokoh et al., 2016). Ribas (2014) identifies financial barriers as one of the factors negatively impacting entrepreneurship in South Africa. Adisa et al. (2014) highlight that the lack of financial records and information asymmetry are the primary reasons SMMEs need assistance to obtain funding, particularly in their early years of operation. Elitcha and Fonseca (2016) report that the lack of capital hampers SMMEs, particularly emerging businesses, in acquiring the necessary fixed costs during their initial years, hindering their operational capabilities. According to Matthee and Heymans (2013), limited access to capital is linked to a lack of business skills, resulting in financial, liquidity, and credit constraints.

2.3.2 Business Skills Deficiency

Adisa et al. (2014) indicates that SMMEs in South Africa experience a skills shortage. The shortage, particularly in emerging businesses, has severely hampered the SMME sector. According to African Economic Outlook (2017), the need for business skills and adequate technical skills are barriers to the competitiveness of SMMEs.

Record Management Deficiency

Sitharam and Hoque (2016) highlight that the success or failure of a business is determined by maintaining accurate and detailed accounting information that provides a transparent financial position. Al-Hyari et al. (2015) argue that record management significantly affects the competitiveness of SMMEs in South Africa. Poor record keeping by SMMEs in South Africa, as noted by Karanja et al. (2013), creates barriers that harm business performance and competition. Abdul-Rahaman and Abdelfettah (2016) assert that poor record keeping or the inability to access financial records leads to inefficient cash management, poor use of business resources, and a high failure rate for certain businesses in their initial years of operation in South Africa. Mandiefe and Bafon (2015) highlight that more than half of SMMEs lack adequate accounting abilities, negatively impacting their financial viability.

Marketing Strategy

Senzu (2018) stipulates that the effectiveness of marketing strategies relies on understanding consumer behaviour. However, SMMEs often fall short of conducting thorough marketing research, as noted by Seeletse (2012). This lack of marketing research hampers SMMEs' ability to compete and achieve business goals. Artinger and Vulkan emphasizes that marketing research is crucial for the business competitiveness of SMMEs as it provides valuable knowledge about market conditions, customer preferences, regulatory issues, and potential business partnerships. The inability of SMMEs to obtain such relevant information due to various circumstances has hindered their ability to compete effectively. Insufficient information gathering negatively impacts SMMEs' ability to compete on a broader scale, as stated by Sidek and Mohamad (2014). Marketing deficiencies make it difficult for business owners to analyse the market concerning business opportunities and consumer behaviour, making data mining challenges.

Tehseen and Ramayah (2015) note that SMMEs find it challenging to compete in the global market, especially when the local market is saturated, due to their lack of understanding of international marketing tactics. Insufficient knowledge of global markets, competitive strategies, and sales management abilities contribute to export issues faced by SMMEs, as highlighted by Tehseen and Ramayah (2015). Many SMMEs lack the skills to conduct market analyses, making it difficult to enter or participate effectively in the global market. Effective marketing, planning, and management are essential for SMMEs to position themselves for growth and survival in the global marketplace, as Ocloo et al. (2014) emphasized. Poor marketing tactics harm SMMEs' ability to compete, and inadequate marketing strategies hinder their entry into the global market and their potential for increased profits. Insufficient branding, pricing, advertising, communication, and marketing strategies make it unlikely for SMMEs to succeed in the global market.

Risk Management

Seeletse (2012) asserts that, particularly in times of high uncertainty and volatility, the business climate substantially impacts the performance and competitiveness of SMMEs. Therefore, SMMEs must develop a strategic mitigation plan to survive such uncertainties and turbulence. Muhindo et al. (2014) articulate that environmental dynamism serves as the vehicle for strategic planning's significance. Uchehara (2017) points out that undertaking strategic planning closely correlates with high environmental uncertainty for SMMEs' survival. Through strategic planning, SMMEs anticipate potential risks that could harm the business. Smit and Watkins (2012) found that businesses ranked risk management as their top concern, especially those just starting since they were more exposed to business climate uncertainty and competition. Ocloo et al. (2014) traverse that environmental uncertainty greatly impacts how well SMMEs perform.

2.4 Skills to Improve Business Performance

The impact of business skills on the competitiveness of SMMEs is a subject discussed in this section. Schild (2014) delineates crucial business skills positively linked to business performance including strategic planning, flexibility, proactive management, and distinct customer orientation. Muriithi (2014) confirms a direct correlation between business skills and growth. Skills development is vital for ensuring long-term competitiveness and innovation capacity. Eniola and Entebang (2016) state that business skills are essential for efficiently managing business resources and achieving corporate goals. As the literature develops, it becomes increasingly evident that business skills contribute to the improved performance of SMMEs.

2.4.1 Performance

Muriithi (2014) delineates corporate performance effectively utilises internal resources to achieve corporate goals. Both financial and non-financial performance measures can be used to assess a business's performance. Muriithi (2014) states that non-financial performance measures include customer satisfaction, employee satisfaction, quality, reputation, and innovation. On the other hand, financial performance measures focus on the survival of SMMEs and can be measured through indicators such as cash flows, quarterly sales growth, operating income, market competitiveness, and return on equity. Umrani et al. (2015) suggest that business performance can be objectively assessed using financial and subjectively assessed using self-reported indicators.

Empirical studies have shown that strategic planning plays a crucial role in developing and implementing a business strategy, leading to improved effectiveness and efficiency. Implementing a strategic plan positively impacts the performance of SMMEs. Vanacker et al. (2014) state that a strategic plan enables SMME owners to analyse internal and external environments, identify critical capabilities, develop long- and short-term budgets that accelerate implementation, and serve as performance management tools. Umrani et al. (2015) suggests that the managerial approach to strategic planning directly affects SMMEs' performance. The strategic planning process also influences business positioning, benefiting, or hindering business performance. Therefore, business positioning and managerial style play vital roles in determining the performance of SMMEs.

3 Methodology

3.1 Research Philosophy and Design

To gain a comprehensive understanding of the challenges faced by SMMEs in South Africa, a pragmatic research philosophy was adopted. This philosophy guided the data gathering and analysis techniques and the research questions essential to the study. In this context, pragmatism integrated the practical investigation of problems in South African SMMEs, combining elements of positivism and constructivism. The positivist perspective, derived from practical investigations, was employed to examine the problems faced by SMMEs in South Africa. On the other hand, constructivism explored the capabilities that South African SMMEs believed were crucial for their survival, particularly in the early years of operation. By adopting a pragmatic approach, the study aimed to gain a clear understanding of empirical findings that could improve the performance of SMMEs and reduce the high failure rate of businesses in South Africa.

The study utilised a mixed-method approach, leveraging qualitative and quantitative research strengths. Specifically, a convergent parallel design was employed to explore and comprehend in-depth the issues that negatively impact the competitiveness of SMMEs. Four research questions framed the study, and the design encompassed qualitative and quantitative phases. The previous section, which discussed the challenges faced by businesses, served as a framework for identifying key issues that pose obstacles to the survival of SMMEs, particularly in their early years of operation. This framework helped diagnose the lack of business skills and limited access to capital, both of which hinder the ability of SMMEs to thrive. Regarding empirical research, the quantitative design focused on identifying intriguing or contradictory patterns.

3.2 Target Population, Sampling and Research Instruments

Businesses registered with the Companies and Intellectual Property Commission (CIPC) in South Africa during the first quarter of 2016 constituted the target population for this study. Small Business Development Agency (2017) delineates the estimated population size of businesses registered with CIPC during that period was 381,668. For the quantitative phase of the study, convenience sampling was used to select the first ten businesses that agreed to participate. Semi-structured interviews were employed as the research tool for the qualitative approach. These

Table 1 Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha on Standardized items	No of Items
0.935	0.936	19

Source: Author

interviews allowed participants to discuss issues relevant to SMME owners from personal and professional perspectives. Closed-ended questions were utilised to identify problems that affect the survival of SMMEs.

Additionally, open-ended questions were included after each objective component, enabling participants to provide further insights into the study's focus. To ensure credibility, rapport was established with participants, alleviating any concerns or anxieties during the interviews. The research objective and proper questionnaire completion instructions were explained using Google Forms, which facilitated the administration of Internet- and intranet-based surveys. Once the survey was generated, all gatekeepers received an email containing the survey hyperlink. The questionnaire underwent slight modifications based on the pre-test results, which assessed the wording and vocabulary used. Cronbach 's Alpha was used to gauge the reliability of all sections relating to research questions. Table 1 indicates the reliability measures for questionnaires. This indicates that the instrument effectively measured the intended variables and that respondents' answers were reliable.

3.3 *Concurrent Data Analysis*

Analyses of primary data were conducted using both quantitative and qualitative methods.

3.3.1 Qualitative Analysis

The interviews aimed to gather qualitative information from the participants to identify the variables affecting SMMEs' survivability. Interviews were voice-recorded, and transcriptions were made to confirm the accuracy of the material. Themes were created by classifying the transcribed input into valuable groups.

3.3.2 Quantitative Analysis

Data was efficiently and effectively analysed through a computer-aided Statistical Package for Social Science software (SPSS) for quantitative findings. The reliability and consistency of the linkage between the survival of SMMEs in South Africa and the business skills deficiency that emerged in the qualitative analysis phase were verified using statistical techniques of the computer-aided software SPSS. The strength and direction of business skills on the survival of SMMEs were assessed using inferential statistics.

3.4 Validity

Factor analysis was performed with construct validity to validate the study's constrained objectives and identify the items best suitable for each goal.

3.5 Reliability

The intercorrelations between the items measuring the concept were tested using interitem consistency with Cronbach Alpha. SPSS was used to calculate Cronbach alpha coefficients. The Cronbach alpha coefficient determines whether or not items were connected, with a closer value indicating stronger internal consistency dependability.

3.6 Ethics Considerations

The project complied with the University's Code of Conduct for Research, and incubators provided letters from gatekeepers.

4 Findings

This section resonates convergent parallel mixed-method research design implemented for the study.

4.1 Qualitative Data

This study used a conceptual, analytic technique for the analysis and a deductive process for classifying and categorising the data. To further contextualise the findings, a framework of literature is then given.

4.1.1 Presentation of Qualitative Data

The first theme of the study focused on identifying factors contributing to the failure of SMMEs in South Africa. More than 50 percent of the participants emphasized three main obstacles to survival: inadequate financial resources for managing account receivables, high capital requirements for accessing funds, and a lack of resources to develop distinctive competencies. Additionally, all participants mentioned marketing, employee relations, consumer pressure from product substitutions, and planning as significant barriers affecting SMMEs' survival. According to the participants, government programs aimed at increasing business competitiveness were perceived as ineffective in ensuring the survival of SMMEs in South Africa.

The second theme explored strategies for building business competencies and capabilities to provide a competitive advantage to SMMEs. Approximately 70 percent of the participants highlighted the importance of focusing on competitive niche markets that align with the business's strengths and capabilities as crucial for enhancing competitiveness and ensuring SMME survival in South Africa. Additionally, 30 percent of the participants mentioned cultivating client connections, cost reduction, and maximising profit margins as additional methods for differentiating emerging businesses from existing ones.

The third theme examined the impact of business knowledge on the competitiveness of SMMEs in South Africa. More than 50 percent of the participants identified marketing skills as essential for breaking into a market. Fewer participants mentioned financial and cost management skills as necessary for effectively managing scarce resources. Accounting and bookkeeping abilities were highlighted by 70 percent of the participants as crucial for improving corporate financial health and as skill gaps within the industry.

4.2 Quantitative Data

To accomplish the study's goal, the questions are divided into sections. Descriptive statistics in frequency, percentage, mode, cross-tabulation tables, and inferential statistics in correlation analysis were produced to compare variables in the objectives.

4.2.1 Reliability of Questionnaires Instrument

According to Table 2, the scale's three dimensions accurately measure each measurement. Table 2 further shows that the current instrument reliably measured the variables it was designed to measure, and that respondents' replies to each question were reliable.

Table 2 Reliability measures for each objective of the questionnaires

Research objectives	Cronbach's Alpha	No of Items
To explore variables that contributes to failure of SMMEs.	0.857	8
To explore variables that are significant to survival of SMMEs.	0.754	6
To what extend does business skills influence performance of SMMEs.	0.756	5

Source: Author

4.2.2 Correlations Analysis

The relationship between the identified contributing factors to the failure of SMMEs in South Africa is measured by the correlation of contributing factors aimed at Table 3. With a Pearson correlation value between 0.400 and 0.600 and a statistical significance level of 0.000, inadequate industry analysis's first contributory force is positively moderately correlated to other contributing forces. The only force negatively correlated with inadequate industry analysis, with a Pearson correlation coefficient of 0.349 and a statistical significance of 0.000, is inadequate business strategy implementation.

A correlation between specified business abilities and SMMEs' survival in South Africa is seen in Table 4. Monitoring cash flow cycles, the first identified business skill significant for SMMEs' survival in South Africa, has a moderately positive correlation with price competitiveness and cost competitiveness, with Pearson correlation coefficients of 0.476 and 0.420, respectively, and a statistical significance level of 0.000. With Pearson correlation coefficients of 0.395, 0.278, and 3.42, respectively, and a statistical significance of 0.000, the monitoring of cash flow cycles is positively poorly correlated with the monitoring of profitability, identification of external opportunities, and customer segmentation.

Table 5 shows how effective business skills are related to one another. The first identified business skills, which are identifying threats equated positively moderately to out-competing rivals, competitiveness in the industry, devised strategies to eradicate business challenges, and bookkeeping (Recording of financial transactions), with Pearson correlation coefficients of 0.405, 0.404, 0.462, and 0.445 respectively, and statistical significance of 0.000, were found to be influential towards the performance of SMME in South Africa.

4.2.3 Factor Analysis

A correlation matrix was subjected to component analysis to find variables that could affect the survival of SMMEs in South Africa.

Table 3 Correlations of contributory forces

		Inadequate industry analysis	Influence of business environment	Inadequate implementation of business strategy	Inadequate financial forecasting	Scarcities of financial resources	Inadequate accessibility of start-up capital	Weak execution marketing strategies	Inadequate marketing research	Lack of brand equity	Poorly developed business plan
Inadequate industry analysis	Pearson Correlation	1	.441**	.349**	.404**	.419**	.445**	.439**	.466**	.416**	.425**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	N	402	402	402	402	402	401	401	400	402	402
Influence of business environment	Pearson Correlation	.441**	1	.284**	.344**	.280**	.363**	.368**	.395**	.426**	.348**
	Sig. (2-tailed)	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	N	402	402	402	402	402	401	401	400	402	402
Inadequate implementation of business strategy	Pearson Correlation	.349**	.284**	1	.380**	.351**	.376**	.337**	.384**	.364**	.396**
	Sig. (2-tailed)	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000
	N	402	402	402	402	402	401	401	400	402	402
Inadequate financial forecasting	Pearson Correlation	.404**	.344**	.380**	1	.311**	.333**	.331**	.321**	.373**	.402**
	Sig. (2-tailed)	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000
	N	402	402	402	402	402	401	401	400	402	402
Scarcities of financial resources	Pearson Correlation	.419**	.280**	.351**	.311**	1	.329**	.337**	.366**	.357**	.367**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000
	N	402	402	402	402	402	401	401	400	402	402
Inadequate accessibility of start-up capital	Pearson Correlation	.445**	.363**	.376**	.333**	.329**	1	.255**	.299**	.354**	.458**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000

	N	401	401	401	401	401	401	400	399	401	401
Weak execution marketing strategies	Pearson Correlation	.439**	.368**	.337**	.331**	.337**	.255**	1	.414**	.417**	.287**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000
	N	401	401	401	401	401	400	401	399	401	401
Inadequate marketing research	Pearson Correlation	.466**	.395**	.384**	.321**	.366**	.299**	.414**	1	.319**	.336**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000
	N	400	400	400	400	400	399	399	400	400	400

**Correlation is significant at the 0.01 level (2-tailed)
Source: Author

Table 4 Correlations of business skills

		Monitoring of cash flows cycles	Monitoring of profitability	Identification of external opportunities	Customers 'segmentation	Price competitiveness	Cost competitiveness
Monitoring of cash flows cycles	Pearson Correlation	1	.395**	.278**	.342**	.476**	.420**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000	0.000
	N	402	402	402	402	402	402
Monitoring of profitability	Pearson Correlation	.395**	1	.212**	.395**	.462**	.390**
	Sig. (2-tailed)	0.000		0.000	0.000	0.000	0.000
	N	402	402	402	402	402	402
Identification of external opportunities	Pearson Correlation	.278**	.212**	1	.240**	.230**	.331**
	Sig. (2-tailed)	0.000	0.000		0.000	0.000	0.000
	N	402	402	402	402	402	402
Customers' segmentation	Pearson Correlation	.342**	.395**	.240**	1	.330**	.290**
	Sig. (2-tailed)	0.000	0.000	0.000		0.000	0.000
	N	402	402	402	402	402	402
Price competitiveness	Pearson Correlation	.476**	.462**	.230**	.330**	1	.306**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000		0.000
	N	402	402	402	402	402	402
Cost competitiveness		.420**	.390**	.331**	.290**	.306**	1

	Pearson Correlation						
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	
	N	402	402	402	402	402	402

**Correlation is significant at the 0.01 level (2-tailed)
Source: Author

Table 5 Correlations of influential business skills

		Identifying of threats	Out-competing rivals	Competitiveness in the industry	Devised strategies to eradicate business challenges	Bookkeeping (Recording of financial transactions)
Identifying of threats	Pearson Correlation	1	.405**	.404**	.462**	.445**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000
	N	402	402	402	402	402
Out-competing rivals	Pearson Correlation	.405**	1	.300**	.353**	.401**
	Sig. (2-tailed)	0.000		0.000	0.000	0.000
	N	402	402	402	402	402
Competitiveness in the industry	Pearson Correlation	.404**	.300**	1	.371**	.415**
	Sig. (2-tailed)	0.000	0.000		0.000	0.000
	N	402	402	402	402	402
Devised strategies to eradicate business challenges	Pearson Correlation	.462**	.353**	.371**	1	.364**
	Sig. (2-tailed)	0.000	0.000	0.000		0.000
	N	402	402	402	402	402
Bookkeeping (Recording of financial transactions)	Pearson Correlation	.445**	.401**	.415**	.364**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	
	N	402	402	402	402	402

**Correlation is significant at the 0.01 level (2-tailed)
Source: Author

4.2.4 Kaiser-Meyer-Olkin

To compare the magnitudes of the observed correlation coefficients in relation to the magnitudes of the partial correlation coefficients, the Kaiser-Meyer-Olkin test was performed. Due to correlations between a group of variables (possible factors) that can be characterised by other variables, KMO values higher than 0.5 are considered adequate, and greater than 0.8 is good. Table 6 shows contributing forces, which have a score of 0.914, competitive variables, which have a score of 0.808, and the influence of business skills on performance, which have a score of 0.813.

4.2.5 Regression Analysis

Table 7 demonstrates the strength of the association between monitoring cash flow cycles, threat identification abilities, and long-term business strategies that help businesses survive in their first year of operation. Monitoring cash flow cycles and recognizing threats are sometimes described as ways to maintain a business in its first year of existence. Therefore, developing abilities in monitoring cash flow cycles and spotting dangers is crucial to a firm' sustainability in its first year of operation. As shown in Table 2, the F-test was used to evaluate the model's overall significance. All the F grades for recognizing threats, tracking cash flow cycles, and sustaining corporate plans are a little bit too high. High F values, the greatest beta coefficients, and low corresponding p values all point to the model's significance.

5 Discussions

The previous section discusses the results of findings obtained through interviews and questionnaires.

Table 6 KMO and Bartlett's tests

Construct	Kaiser-Meyer-Olkin	Sig.
Contributory forces	0.914	0.000
Competitive variables	0.808	0.000
Influence of business skills on performance	0.813	0.000

Source: Author

Table 7 Multiple regression analysis

Model	Dependent variable	Independent variable	Beta Coefficient	F-calculated	p-value
1	Sustaining business strategies	Monitoring of cash flows cycles	0.360	96.526	0.000
		Identifying of threats	0.321	96.526	0.000

5.1 Qualitative Analysis

The first theme aimed at factors detrimental to South Africa's SMMEs' ability to be competitive. Most participants stated that access to finance and a lack of financial resources to manage account receivables are the two significant challenges SMMEs face in South Africa. Participants also mentioned that the business's short-term financial policies needed to be more elastic due to insufficient access to financing.

The second theme sought to pinpoint elements crucial to the survival of SMMEs in South Africa. The findings highlighted that participants' expertise in the business helped them lessen the influence of microenvironment and microenvironment forces that are important to the survival of SMMEs in South Africa. The ability to create business strength and achieve competitive excellence in the sector was a vital benefit of the experience. Additionally, industry knowledge aided in identifying competitive weaknesses from which market prospects related to joining and penetrating the new market and market expansion emerged. Participants stated that breaking into the existing market is easier when consumers substitute products from well-known brands. However, as new business players identified those competitive weaknesses via industry expertise, they were transformed into market possibilities and significantly contributed to targeting small markets, such as niche markets, that established organisations overlooked.

The third theme was determining how business skills affected SMMEs' performance in South Africa. The findings showed that participants needed help to improve the financial situation of their limited financial resources, presenting a barrier to the business' sustainability. A vital issue participant identified is the need for accounting abilities to reduce translation and transaction exposure from the fluctuation of the foreign exchange market, which impacts on the business's competitiveness. Participants also mentioned that developing financial strategies to increase the business's liquidity while working with limited financial resources is a barrier to the business's sustainability. Due to a lack of bookkeeping abilities, participants noted that creating and analysing financial statements and maintaining financial records might be difficult.

5.2 Quantitative Analysis

The key findings from the previous section are categorised relative to the research's goals. The results that have been categorised are further examined and discussed in relation to the statistical methods utilized in the preceding section.

5.2.1 Identified Contributory Forces That Contribute Towards the Failure of SMMEs

The study identified several factors contributing to the failure of SMMEs in South Africa. The primary factor with the highest correlation and frequency distribution is inadequate industry analysis. This factor was consistently found to be the leading cause of SMMEs failure in their first year of existence. The second contributory force is the influence of the business environment, which weakly correlates with poor industry research and a lack of brand equity. Both factors were identified as significantly influential in SMMEs failure, with approximately equal distribution among responses. However, according to correlation and frequency distribution analyses, they had less dominance compared to inadequate industry analysis.

The third contributory force is poor business plan implementation, which moderately correlates with other factors to SMMEs failure. Approximately 42.8 percent of respondents considered this factor highly influential in the failure of SMMEs. Inadequate financial forecasts, the fourth force, are moderately connected to poor industry analysis and poorly developed business plans. These factors significantly impact whether an SMMEs succeeds or fails, with 54.5 percent and 38.3 percent of responses, respectively. According to 47.3 percent of respondents, inadequate financial forecasting is the primary cause of SMME failure. The fifth force, financial resource scarcity, weakly correlates with inadequate industry analysis. This factor is highly influential in the failure of SMMEs, with scores of 54.5 percent and 40.3 percent, respectively, in the frequency distribution. Compared to preliminary industry analysis, financial resource scarcity is less prevalent in correlation and frequency distribution analyses, with 40.3 percent of responses.

The sixth force, a lack of start-up funding, moderately positively correlates with weak industry analysis and poorly written business plans. It is identified as less prominent than inadequate industry analysis, with 44.4 percent of responses in correlation and frequency distribution analyses. The seventh force are positively and marginally connected with the ineffective execution of marketing plans. These factors are highly influential in the failure of SMMEs, with scores of 54.5 percent, 41.5 percent, and 43.0 percent, respectively, in the frequency distribution. Inadequate industry analysis significantly contributes to weak execution of marketing plans, insufficient marketing research, and a lack of brand equity. The eighth force, weak industry analysis and poorly executed marketing strategies, moderately positively correlates with poor marketing research. These factors are high and extremely influential in SMMEs failure, with scores of 54.5 percent.

5.2.2 Identified Business Skills That Are Significant Towards the Survival of SMMEs

Monitoring cash flow cycles, the first skill identified as essential for SMMEs' survival, is moderately positively correlated with price and cost competitiveness.

The moderate correlation score is consistent with the values of 56.2 percent, 40.5 percent, and 42.8 percent from the frequency distribution, indicating high and extremely significant business skills for the survival of SMMEs. Monitoring cash flow cycles is more important than other crucial business skills for SMMEs' survival in correlation analysis and frequency distribution. The second highlighted business skill, profit monitoring, is vital for the survival of SMMEs and is moderately positively correlated with price competitiveness. According to the frequency distribution, the moderate correlation score is consistent with 42.3 percent and 40.5 percent, indicating highly and extremely significant business skills for the survival of SMMEs. Compared to other essential business skills for SMMEs' survival, profit monitoring dominates the correlation analysis and frequency distribution.

The importance of the third recognized business skill for the survival of SMMEs is weak and positively correlated with identifying external opportunities. Although a weak positive relationship exists between identifying external opportunities and the remaining identified business skills, 42.3 percent of respondents in the frequency distribution consider these skills extremely important for SMMEs' survival. Customer segmentation and the significance of the remaining identified business skills for the survival of SMMEs are weak and positively correlated as the fourth recognized business skill. Customer segmentation and the significance of the remaining identified business skills for the survival of SMMEs are weak and positively correlated as the fourth recognized business skill. Customer segmentation and the remaining identified business skills have a tenuous positive association, but 41.0 percent of respondents believe these skills are critical for SMMEs' survival. Based on the data mentioned earlier, customer segmentation helps businesses survive their first year of operation but may not significantly impact their long-term success. Although a modest correlation exists between customer segmentation and the other identified business skills, 41.0 percent of respondents considered these skills extremely important for SMMEs' survival. Based on the data mentioned earlier, customer segmentation helps businesses survive their first year of operation but may have little impact on their long-term success.

Monitoring cash flow cycles and other management skills are considered more critical for the survival of SMMEs than price competitiveness, according to the correlation analysis and frequency distribution. The last recognized business skill necessary for the survival of SMMEs is cost competitiveness, which is moderately correlated with monitoring cash flow cycles and profitability. The moderate correlation score corresponds to 56.2 percent, 42.3 percent, and 40.5 percent from the frequency distribution, indicating highly effective business skills for the survival of SMMEs. Monitoring cash flow cycles is considered more prominent concerning SMMEs' survival than cost competitiveness, as shown in the correlation analysis and frequency distribution.

5.2.3 Influence of Business Skills on Business Competitiveness of SMMEs

The identified business skills correlated with the performance of SMMEs include the ability to recognize threats, outcompete competitors, be competitive in the industry, develop strategies to overcome obstacles and keep accurate records of financial transactions. According to the frequency distribution, these skills have a positive and moderate correlation, with percentages of 52.0 percent, 42.8 percent, 40.5 percent, 42.8 percent, and 41.0 percent indicating highly and extremely effective business skills for the performance of SMMEs. Threat recognition, as identified in the correlation analysis and frequency distribution, is particularly influential in outcompeting competitors, industry competitiveness, strategies developed to overcome obstacles, and bookkeeping (recording financial transactions). Outcompeting competitors is moderately associated with threat recognition and bookkeeping (recording financial transactions) in the second identified business skill that significantly impacts the performance of SMMEs. The moderate correlation score aligns with frequency distribution results of 42.8 percent, 52.0 percent, and 41.0 percent for highly and extremely effective business skills for the survival of SMMEs, respectively. The correlation analysis and frequency distribution indicate that outcompeting rivals are less dominant than threat recognition. The ability to devise solutions to overcome problems is the second-to-last identified business skill that has been found to impact the performance of thriving SMMEs.

This skill is only modestly positively associated with threat recognition. The moderate correlation score aligns with frequency distribution estimates of 42.8 percent and 52.0 percent as high and highly influential business skills for the survival of SMMEs, respectively. Developed problem-solving approaches are considered less dominant in correlation analysis and frequency distribution than threat identification. The last but not the least recognised business skill, bookkeeping (recording financial transactions), is moderately correlated with threat recognition, outcompeting competitors, and industry competitiveness. It significantly impacts the success of SMMEs in South Africa. The moderate correlation score aligns with frequency distribution estimates of 52.0 percent, 42.8 percent, and 40.5 percent as highly and extremely effective business skills for the survival of SMMEs. The correlation analysis and frequency distribution indicate that bookkeeping is less critical than threat recognition. The influence of business skills on the performance of SMMEs has a sampling adequacy score of 0.813, which is considered meritorious. The correlation matrix was assessed and confirmed to be an identity matrix using Bartlett's test of sphericity, with a result of 0.000 indicating a correlation between the skills. Redundant skills were minimised by analysing and identifying correlation patterns within the measurements. Eigenvalues were used to retain all elements more prominent than one, and identifying threats is one of the eigenvalues that influence business skills and performance.

6 Conclusion

The study focused on identifying the factors that affect the competitiveness of SMMEs within business incubators. Existing literature highlights two key factors: inadequate finance and a lack of business skills. To explore additional factors influencing SMMEs' survival, particularly in the initial years of operation, interviews were conducted as an alternative research method. The analysis of the interviews resulted in fierce competitive pressure that emerges from a business environment as an additional contributory force towards the high failure rate of South African SMMEs. This study's finding steered the researcher to investigate the antecedents' business competencies' significance for survival and explore the different relationships between business skills that emerged from the literature. Literature and personal interviews outlined financial management, marketing, and business management as significant towards the survival of South African SMMEs. In addition, enunciated marketing skills as influential towards market penetration, financial, cost management skills and management skills as effective for adequacy to manage limited resources.

7 Recommendations

SMMEs in South Africa could consider the recommendations below to eradicate business deficiency that sub-par business competitiveness.

7.1 Bookkeeping

Poor financial records and information asymmetry are two consequences of the capital shortfall discussed earlier. The study aims to assist SMMEs in generating cash inflows and improving their efficiency. According to Chelimo and Sopia (2014), bookkeeping serves as a repository for financial changes within a business. Two commonly used bookkeeping methods are the single-entry and double-entry systems. The single-entry system, which focuses on single transactions and is primarily used for tax purposes, offers advantages. During the initial years of operation, the single-entry system can be useful for SMME owners to track recent losses and profits. As their businesses grow and gain capabilities, owners can adopt the self-balancing double-entry method, which employs debits and credits to record business transactions. This system ensures that the total value of debits recorded equals the total value of credits. This system provides a comprehensive view of the income statement and balance sheet when used with the accrual bookkeeping method (Chelimo & Sopia, 2014, p. 434).

7.2 Business Strategy

Owners of South African SMMEs have a crucial responsibility to align their strategy formulation with the guiding principles of their business. The corporate plan should be structured into short, medium, and long-term timeframes. Business owners need to define the parameters and timeline for each planning period. To achieve alignment, SMME owners must ensure that their operational processes and practices align with all three facets of the overall business strategy. According to Brown (2014), SMME owners aiming for high-performance systems should develop an open, system-based, and flexible strategy to adapt to changing business conditions. South African SMME owners should consider the relationship between their operational policies and business strategy, especially during the first year of operation.

8 Limitations

- The study's inclusivity toward SMMEs participating in incubator programs was its main weakness. Even though the contributing factors for businesses in incubation programs and businesses outside of incubation programs may be similar, there may be a slight difference because businesses in incubation programs receive technical support services in comparison to businesses outside of incubation programs.
- The second limitation applied to study participants who were either business owners or employees and who experienced anxiety when discussing information with academic students. Although the interviews' confidentiality and anonymity were assured, participants' fears that competitors may learn their secrets led to anxiety. However, in the study, confidentiality and anonymity were maintained.

9 Recommendations for Future Studies

- The suggestion is the study that will focus on both SMMEs that are under an incubation program and SMMEs that are not under the incubation program. This approach will result in a wider spectrum of generalisability of challenges that are affecting the SMME sector.
- The extant literature on corporate governance on SMMEs obtains astonishingly little attention. Corporate governance in SMMEs is limited or intermittent. There is very diminutive information about governance in SMMEs.

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Solar Photovoltaic Panels Tax Rebate: Is the Tax Rebate the Right Tax Incentive Choice for South Africa?

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Abstract The devastating effects of the global Covid-19 pandemic persist, and severe levels of load shedding have a further impact on South Africa's economy. The consequences of load shedding continue to cripple all economic sectors. The introduction of the solar photovoltaic panel tax incentive was announced in the 2023 Budget Speech to mitigate these negative effects on households. However, this proposed incentive has several limitations, as the requirements would exclude a large number of ordinary South Africans from accessing the solar tax incentive. Considering this, the aim of this study was to investigate the tax incentive options that could be used to assist South Africans in their transition to solar energy, thereby ensuring a more inclusive transition. To provide a deeper understanding of alternative measures that could offer more sustainable initiatives, several options were analysed and reviewed. The study employed a qualitative research methodology and a review of existing literature as the research technique. Zero-rating is the most equitable instrument. If implemented, the results and recommendations will provide some form of tax relief to all individuals and encourage investments in solar photovoltaic panels, thereby achieving the policy goals of encouraging investments by individuals in clean energy.

Keywords Incentive · Allowance · Zero rate · Load shedding · Solar photovoltaic panel

1 Introduction

The current situation in South Africa, characterised by ongoing load shedding, is a contributing factor to the sustainability of the economy and has resulted in the need for an action plan to encourage investment in more sustainable alternatives. South Africa's energy crisis is in a critical state due to several factors, including

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limited energy generation capacity, ageing power plants, and a lack of investment in solar and alternative energy sources.

South Africa is also a participant in the Just Energy Transition Investment Plan (JET-IP), which has a 5-year objective of transitioning to a low-carbon economy for growth and addressing future climate change assistance. Due to a global objective, other countries have adopted a similar stance and shifted to green energy production. Tax incentives are used to encourage investments in green energy production.

Tax incentives have been implemented and used for decades to address different social problems and investment goals (Surrey, 1970). An incentive is an international taxation tool to assist with establishing short- and medium-term goals (Klemm & Van Parys, 2012). Tax incentives are fiscal policies implemented by the government in the form of special exclusions, exemptions, or credits to reduce taxpayers' tax liability in order to achieve a specific objective.

1.1 Background

The 2023 budget proposals also include a tax rebate for individuals who install solar photovoltaic (PV) panels on their houses (National Treasury, 2023b). The investment in solar PV panels by individuals will take pressure off the grid. A secondary benefit is the production of cleaner electricity. This proposal allows individuals to claim a credit against their tax liability for the 2024 tax year and is only valid for this year. Therefore, this relief encourages individuals to install solar PV panels immediately to receive the benefit. A total of 25% of the cost price of the solar PV panels will be refunded, but the maximum rebate is limited to R15 000.

The South African government asserts that economic growth is its primary objective, but the sustainability of electricity remains an obstacle for business (Wabukala et al., 2022). Small and medium-sized enterprises are key drivers of economic growth (Maziriri & Chivandi, 2020). Tax incentives will encourage investment into alternative electricity generation options which can introduce long term growth and sustainability (Victoria et al., 2021).

From a National Treasury point of view the incentive was introduced to increase the use of solar which will partially address South Africa's energy crisis and encourage private household investment into the generation capacity expansion. The proposed solar PV panel rebate will be able to be claimed the individual taxpayers in the 2023/24 (i.e. for the period 1 March 2023 to 28 February 2024) tax filing season when tax returns are filed. Taxpayers will be able to claim the incentive as a rebate against any taxes that are due by the taxpayer in computing the final tax payment for the 2023/24 tax filing season.

Adam Smith argued in The Wealth of Nations (1776) that a good tax system should include the four principles of fairness, certainty, convenience, and efficiency (Smith, 1994). The concept of tax fairness of the tax system should be equitable to all the countries citizens. Different opinions exist on how to reach tax fairness. There should always be a balance of what is fair to the individual and what's fair to society.

The common good of a tax system state that a primary function should be redistribution of wealth that focused on the good for the society i.e. all citizens should benefit from the taxes collected equally. This study therefore questions the fairness of the proposed tax incentive and investigates alternatives.

1.2 Problem and Rationale for the Study

The recent announcement in the 2023 budget that the solar PV panel tax rebate for individuals will be implemented for the 2024 tax year from 1 March 2023 to 29 February 2024 led to several uncertainties about the application of the tax rebate, but also raised the question of the fairness of the tax incentive (Van Schalkwyk, 2023; Visser, 2023). The proposed tax benefit will not benefit lower-income households who may not be able to afford solar but will still have to rely on Eskom for their power supply. Therefore, the solar PV panels tax credit does not adopt an all-encompassing approach by ensuring that all taxpayers can benefit of the incentive. The authors of this paper also argue that the solar PV panels tax incentive in South Africa is aimed at the upper-income bracket. This study analysed tax instrument alternatives that are in the best interest and for the benefit of all South Africans.

The research question is "what is the most viable option for a tax incentive that ensures all taxpayers can benefit from it?"

1.3 Research Objective

The objective of this study was to explore the most viable tax incentive option which will benefit all South Africans. This objective gave rise to the following research question: What are the different alternative instrument options and their advantages and disadvantages?

1.4 Contribution of This Study

This study proposes a tax instrument that achieves fairness, i.e. if implemented, it will benefit all individuals. The next section discusses the research methodology and research methods employed in this study.

2 Research Methodology

Since the data source and output for this study are both in textual format, a qualitative research methodology was used.

The purpose of a literature review is to collect and synthesise the primary findings of research studies conducted on a specific topic (Rozas & Klein, 2010). The literature review serves as an easy-to-understand 'summary' of studies, highlighting where study findings concur and/or conflict (Cooper & Hedges, 1994). As a result, the primary value of the traditional literature review is to provide the newcomer or 'visitor' to a subject area with a reasonably comprehensive overview of the current state of relevant knowledge. The objective of the researcher is to describe and analyse the literature from a contextual or theoretical perspective (Demeyin, 2016). In literature review studies, the evidence is frequently synthesised qualitatively.

The review of the literature analysed empirical studies conducted in relation to the various tax incentive options to determine the advantages and disadvantages of the various incentive options. This was done with the aim of answering the research question, "what is the most viable option for a tax incentive that ensures all taxpayers can benefit from it?" Using search engines such as Google Scholar and the University of Johannesburg's (UJ) databases, i.e., UJ Google (UJ's library search engine), online searches were conducted to gather information and documents. The websites of the following institutions were also searched: professional accountancy firms; government, such as SARS and the National Treasury; and international organisations, such as the Organisation for Economic Co-operation and Development (OECD) and the International Monetary Fund (IMF). The search terms used included, but were not limited to, incentive, credit, rebate, allowance, deduction, zero rate, load shedding and solar PV panel.

The following section provides an overview of the new rooftop solar tax credit for individuals.

3 Energy Incentives Contained in the 2023 Budget Proposals

On 22 February 2023, the Finance Minister delivered his annual budget speech and announced no tax increases to generate additional revenue (National Treasury, 2023a). Considering the current economic climate, this was not unexpected. Instead, the budget announced R13 billion in tax relief (National Treasury, 2023a). Individuals who install solar panels receive R4 billion in tax relief, (National Treasury, 2023b). By not adjusting the general fuel levy, an additional R4 billion in relief is provided. The tax relief package is funded by increased revenue collections, primarily a windfall caused by rising commodity prices.

3.1 Individuals: New Rooftop Solar Tax Incentive

3.1.1 Scope

Individuals who installed solar PV on their rooftops at a residence used mainly for domestic use are eligible for a tax rebate (National Treasury, 2023a). Portable panels will therefore not qualify. Only new and unused solar PV panels qualify to ensure that the capacity is in addition to what the country already has in place. The panels can be installed as part of a new system or as an extension of an existing system. Furthermore, only solar PV panels with a minimum capacity of 275 W per panel (design output) qualify for the rebate.

The solar panels must be purchased and installed at a private residence, and a Value-Added Tax (VAT) invoice must be produced together with an electrical compliance certificate that was issued between 1 March 2023 and 28 February 2024 (National Treasury, 2023a). Therefore, the incentive is only available for a period of one year.

Solar PV panel installations by either landlords or tenants are eligible for the rebate, but only the party who paid for the solar panels can claim the rebate (National Treasury, 2023c). If residents of sectional title schemes are permitted to install their own solar panels, they will be eligible for the same tax rebate as other individuals (National Treasury, 2023c). However, body corporates are ineligible to receive the tax credit. According to the National Treasury (2023c), "[b]ecause there would be some adjustments to ensure that the right people could claim the right amounts, there will be consultation to determine the required approach and documentation" (p. 3).

3.1.2 Implication

Individuals will be eligible for a tax rebate equal to 25% of the price of any new and unused solar PV panels (National Treasury, 2023a). To prioritise the promotion of additional generation, the rebate is only available for solar PV panels, and not for inverters or batteries. The rebate can be used to offset up to R15 000 of the individual's personal income tax liability for the 2024 tax year. As an example, individuals who purchase 10 solar panels at a cost of R40 000 can reduce their personal income tax liability by R10 000 for the 2024 tax year.

3.1.3 Claw-back

Individuals will not be required to repay the rebate if they sell their house after installing solar panels, because the panels are likely to remain attached to the house and be used by the subsequent owner, allowing for an expansion in generation (National Treasury, 2023c). However, the rebate will be clawed-back if the panels are sold within a year of their initial installation.

3.2 Limitation of the Study

The legislation governing the tax proposals has not yet been finalised and implemented (Heher, 2023). The information provided by the National Treasury is contingent on the outcome of the consultation process on the proposal and the final legislative decisions made by Parliament. The legislation is contained in the 2023 Draft Taxation Laws Amendment Bill, which has been published for public comment (SARS, 2023). Each year in October, the Minister of Finance presents tax bills during the Medium-term Budget Policy Statement. Parliament considers the amendments, after which the President can give approval – typically by January of the year following the announcement. This is a study limitation because the study is based on the budget announcement and not on actual legislation that has been passed. Therefore, the results of the consultation process might differ.

3.3 Authors' Comments

As mentioned earlier, according to Adam Smith, an economist and pioneer in the early 1700s, a good tax system should encompass four pillars, namely fairness, certainty, convenience and efficiency. The principle of equity is often viewed as a fairness principle (AICPA, 2001). Equity which is linked to the fairness pillar in taxation is crucial for both ethical and pragmatic reasons (Osberg et al., 1993). Citizens have the right to expect 'fairness' in all aspects of public policy, including taxation. In this regard, the research problem of this study was that the new rooftop solar tax credit introduced by SARS is not equitable, because it does not apply to all South African citizens and therefore does not take an inclusive approach. According to Heher (2023, n.p.), "[t]he South African Photovoltaic Industry Association (SAPVIA) said the benefit of the scheme is limited, and it will not help households that cannot afford to buy a solar kit", thereby questioning the fairness of the tax rebate. Furthermore, according to Mavuso (2023, n.p.), the chief executive officer of Business Leadership South Africa commenting on the solar roof tax rebate said:

> There are many complex issues to navigate to ensure that this is a success for the majority of the country—*a half-hearted approach is not likely to make much of an impact, and there's a danger that this benefits only high-income earners*. (emphasis added)

Further, according to Madonsela (2023, n.p.):

> The *policy on buy and claim from SARS is social justice dissonant in that it ignores that poor and lower economic echelon people do not have the required capital outlay* and also will get little back as the stipulated percentage rebate is miniscule in rands. (emphasis added)

These sentiments are therefore in support of the research problem at hand.

The expanded tax incentive for companies is more attractive. The effective tax deduction of the expenditure is 33.75% (i.e. 125% deduction multiplied by 27%, being the company tax rate) if the company has a positive taxable income against which to offset the deduction.

The new incentive is only available to individuals for a period of one year and the expanded incentive is available to businesses for a period of two years; therefore, if the incentive is effective, it may create a demand for solar PV panels, causing prices to rise, and the incentive will simply be offset by higher prices. Majola (2023, n.p.), in a statement that supports this contention by the authors of this study, says:

> Solar panel shortages in South Africa may lead to price increases on the available products with the impact of this more likely to be felt by smaller businesses, as well as medium and lower-income households with smaller budgets, according to KPMG partner and head of energy and natural resources Safeera Loonat.

Therefore, if the incentive is to be effective, the authors of this paper submit that this industry must be regulated (i.e. the installers should be regulated)!

The next section investigates the literature to present the benefits and drawbacks of the various tax incentive instruments that the National Treasury can apply.

4 Literature Review

The literature review utilises previous studies to determine the usefulness, applications, and results of several existing tax incentives. The studies is categorised in groups which highlights the advantages and disadvantages and promoting fairness of such a policy.

The incentives are categorised into two main sub-categories namely:

- Direct taxes (i.e. income tax):
  - Tax rebates and credits
  - Tax allowances
- Indirect taxes (i.e. VAT):
  - Zero-rating

4.1 Income Tax: Tax Rebates and Credits

In terms of section 6 of the Income Tax Act, a tax rebate is applied after the taxpayer's tax liability has been calculated for the year of assessment, and when certain conditions are met, will reduce the tax liability for the assessed year (South Africa, 1962). South Africa currently utilises the age rebate, which reduces the tax liability according to the taxpayer's age.

In addition to the age rebate, section 6B to the Income Tax Act also contains a medical scheme fees tax credit, which is used to reduce a person's normal tax liability. Any portion not allowed in the current year (typically the amount in excess of the normal tax liability) cannot be carried forward to the subsequent year of assessment. Further, section 6quat of the Income Tax Act permits taxpayers to claim a tax credit against South African taxes paid on foreign-earned income for foreign taxes paid on the same income.

As an international example, Spain invested in solar incentives to advance the investment to a renewable energy source for their citizens; however, this was deemed to be insufficient and alternative options needed to be investigated. The instruments used directly relating to fiscal policies where tax allowances and grants which was found to be insufficient as Spain only reached half of the goals set out to reach the solar installation targets (Pablo-Romero et al., 2013).

The proposed solar PV panel tax incentive falls into this category. The advantages, disadvantages and fairness application for the individual are as follows:

4.1.1 Advantages

- Registered taxpayers may claim the incentive against their tax liability for the tax year.

4.1.2 Disadvantages

- Limited to taxpayers who are registered with SARS (Ramalho, 2007).
- Limited to tax liability of the individual for the year of assessment.
- Require a SARS audit to validate the claim, resulting in compliance costs for both the taxpayer and SARS.
- Funded by tax collections.
- If the incentive is effective, it will create a demand for solar PV panels, causing prices to rise, and the incentive will simply be offset by higher prices.
- The tax benefit will only be realised when the taxpayer files their tax return for the tax year which has a delayed benefit outcome.
- The incentive is limited to a maximum of 25% of the cost of solar PV Panels only.
- It excludes installation cost, hardware and other important equipment required.
- Limited to home installations only.
- Cost to obtain installation certificates as proof to qualify for the rebate.

4.1.3 Tax Fairness

For the greater good of South Africa, the tax incentive is intended to encourage households to invest in sustainable energy generation alternatives that will contribute capacity to the existing electricity grid and contribute to the attainment of green energy environmental goals. R150 000 is the average price of a PV solar system (Businesstech, 2023). Thus, only middle- and high-income taxpayers who can afford the cost of solar PV panels and the additional hardware expenditure are eligible for the tax credit. 18.2 million South Africans lived in extreme poverty in 2022. According to Tax Statistics 2021 from the National Treasury, only 5,213,796 taxpayers filed tax returns in 2020. Only 1,607,500 of the total number of registered taxpayers fall into the middle- and upper-income tax brackets. This evidence demonstrates that the vast majority of citizens do not qualify for this tax incentive. This tax incentive therefore excludes the vast majority of South Africans (National Treasury and the South African Revenue Service, 2022).

4.2 Income Tax: Tax Allowances

A tax allowance is a deduction that taxpayers are allowed to make from their taxable income before the tax liability for the year of assessment is calculated. Section 12B of the Income Tax Act is an example of a tax allowance. Section 12B provides business with a tax deduction in respect of certain machinery, plant, implements, utensils and articles used in framing or production of renewable energy. Tax allowances were compared to other fiscal policies, and it was deemed that tax allowances are more suitable for business income tax advantages (Halimatussadiah et al., 2023).

4.2.1 Advantages

- Reduce the taxpayer's taxable income for the year of assessment.
- Can create an assessed loss that is carried forward.

4.2.2 Disadvantages

- Limited to taxpayers who are registered with SARS.
- Benefit only received when the taxpayer's tax return is submitted.
- Require a SARS audit, which results in compliance costs.
- Require a SARS audit to validate the tax deduction, resulting in compliance costs for both the taxpayer and SARS.
- Funded by tax collections.
- If the incentive is effective, it will create a demand for solar PV panels, causing prices to rise, and the incentive will simply be offset by higher prices.

4.2.3 Fairness

As is the case with tax rebates and credits, the poor do not receive any monetary benefit from a tax deduction; this is a recognised limitation of this tax incentive, which is acceptable as it is aimed at businesses rather than individuals.

4.3 VAT: Zero Rating

In contrast to the previous tax principles which are income related and more beneficial to the registered taxpayers, the indirect taxes are taxes levied on goods and services. Indirect taxes are levied at the same rate to all citizens irrespective of their income or tax status, making it a regressive tax. Regressive tax is defined as a tax that is applied uniformly regardless of income (Tax Foundation, n.d.).

VAT is an example of indirect taxes. The Value-Added Tax Act 89 of 1991 of South Africa provides for taxation in respect of the supply of goods and services and the importation of goods and services, whereas direct taxes are based on income and will increase proportionally on the income earned (South Africa, 1991). Solar lights, torches, backup batteries, inverters, and other equipment used to generate alternative electricity are subject to VAT at the standard rate of 15%. The poor will be unable to afford an investment in solar PV panels and a complete system to mitigate the daily effects of loadshedding. As a result, they will be liable for the 15% VAT on the consumption of goods used to generate alternative electricity.

VAT is levied at the same rate on the consumption of goods and services, and higher- and lower-income groups pay the same rate of VAT.

By introducing zero rating on specific goods and services, however, lower-income groups can be shielded from VAT costs (Little, 1951).

Indirect tax reform must be pro-poor to assist in mitigating the social problems of the poor. (Gibson, 2019). The impact on indirect taxes on the poor was also researched in Tanzania to increase the livelihood of its citizens. The results of the first reform revealed a positive effect on government tax revenue and a neutral effect on income distribution and poverty (Maskaeva et al., 2019).

4.3.1 Advantages

In contrast to the tax rebates and allowances, the consumer in the case of indirect taxes does not need to be a registered taxpayer with SARS (Kour et al., 2016). Zero rating of VAT on certain items is aimed at assisting the poor of a country, i.e. the supply of goods or services does carry a VAT charge, but at 0%. Alderman and del Ninno's (1999) research paper conducted in South Africa illustrates the revenue forgone with zero tax rates on calorie and protein consumption and compares the tax relief for the poor and change in nutrients consumed from alternative tax exemptions. The findings were that zero rating increased sales of zero-rated products.

The United Kingdom introduced zero rating effective 1 April 2022 for a five-year period on installations of energy-saving materials per VAT Notice 708/6 (HMRC, 2023). The Netherlands followed by reducing the VAT rate to 0% on PV panels as from 1 January 2023 if solar panels are installed on houses or outbuildings of houses (Netherlands Enterprise Agency, 2023).

The effect of zero rating of goods and services in relation to solar lights, smaller investors, and alternative energy sources, which are within the financial means of the poor, will reduce the cost of the purchase and assist them in their daily livelihood. A matric school learner will benefit more from a smaller solar system that provides light than from a rooftop solar system that is out of their family's financial reach. The zero rating will encompass the entire community, not just the financially able individuals.

4.3.2 Disadvantages

South Africa is an associate and participant in the OECD, and as a result, South African policymakers gain access to the OECD's expertise and good policy practices (OECD, 2021). Recent studies, such as the Mirrlees Review, support the OECD view, arguing that a broad base with a single standard rate would permit substantial revenue growth while reducing tax administration costs for the revenue collection agency and compliance costs for businesses (Mirrlees et al., 2011). The view that VAT is not a suitable instrument for altering social behaviour or advancing equitability is strongly supported by research (Ian et al., 2010). This calls into question the effectiveness of zero rating, which is intended to influence social behaviour and promote equality.

The Davis Tax Committee (DTC) concluded that zero rating is an overly blunt instrument for addressing issues of equality; however, the DTC believes that eliminating current zero ratings would be difficult, because no ideal compensation alternative has yet been identified (DTC, 2018).

In response to a report of the Standing Committee on Finance and the Select Committee on Finance (compiled after public hearings) and the Cabinet statement of 28 February 2018, the Minister of Finance, through the DTC, demonstrated quite clearly that the VAT system is not an ideal instrument to provide a subsidy. In the case of primary foodstuffs, for example, only 10% of the consumption of primary foodstuffs (where the VAT relief lies) is by the 30% poorest people, who are the intended target group. The Panel found that the richest 10% benefited in monetary terms nearly double (i.e., R1.3 billion) to what the poorest 10% (R830 million) did from zero-rated goods. Furthermore, as VAT is a transactional tax through the value chain, there is no evidence that businesses in the value chain are not mainly absorbing the VAT relief as additional profit, rather than proportionally reducing the retail price of the end product with the full relief of the VAT.

4.3.3 Fairness

Although VAT is not the best instrument to promote tax equality or change behaviour, it has a broad effect for the country's citizens (Ian et al., 2010). Therefore, if zero rating is introduced with adequate regulation, the benefits will reach the citizens. Edward Kieswetter, Commissioner of SARS, speaking at the PSG Think Big series on 7 February before the announcement of the 2023 budget, stated that he would also like to see tax incentives or concessions for households investing in their own energy generation, or using the VAT system to zero-rate products that offer alternative energy solutions (Paton, 2023). The citizens in a whole will have an immediate financial benefit from zero-rating and will assist the poorest of the poor.

And finally addressing the fairness of VAT as regressive tax could, in theory, be the best way to finance pro-poor spending, which more than offsets any anti-poor effect of the tax and could reduce the demand to electricity capacity whilst alternative solar investments options are researched (Ebrill et al. 2002).

5 Conclusion

This study examined the proposed solar PV tax rebate, which is aimed at a small segment of citizens, as well as other tax incentive options that will include a larger segment of citizens. A review of existing literature was conducted to summarise the basic facts for easy comprehension and application in the context of an alternative tax incentive as an inclusive solution for South Africa. Although the reviews may be conducted by subject matter experts, they may be biased due to preconceived notions or conclusions. In this regard, the authors of the paper, who are both registered tax practitioners under section 240 of the Tax Administration Act No. 28 of 2011, reviewed and analysed the literature, by presenting the benefits and drawbacks of the various tax incentive instruments that SARS can apply and made conclusions based on the evidence presented (South Africa, 2011). The fact that this study is based on budget proposals rather than actual legislation presents another limitation. As a result, promulgated legislation may be different from the proposals after the consultation process.

The budget speech for 2023 announced new and expanded tax incentives to invest in renewable energy and thereby increase South Africa's electricity generation. A new tax rebate to encourage individuals to invest in renewable energy was announced. In order to encourage businesses to become more self-sufficient during load shedding and to ensure a productive economic environment, the renewable energy tax incentive for businesses available as an allowance was also expanded to provide better tax benefits for businesses, thereby encouraging them to become more self-sufficient and fostering a productive economic climate. The new tax incentive for solar PV panels is aimed at individuals who are registered taxpayers with SARS in the higher-income bracket and offers a minimum tax credit of R15 000 if the requirements are met. The tax incentive is provided in the form of a tax rebate. This incentive is valid for 12 months, until 28 February 2023.

The tax rebate designed to encourage individuals to install solar PV panels has a number of restrictions. The fact that it does not apply to all South African citizens raises an equity concern, which is one of the principles of taxation and the subject of this study's research question. Moreover, given the amount of the required investment, it is aimed at individuals with higher incomes. The authors of this paper contend that these individuals have already invested in solar PV panels and are therefore ineligible for this tax rebate. Even if the policy objective is realised, it will simply drive up product demand, which will increase the price of solar PV panels, so any tax rebate benefits will be absorbed by suppliers. Allowances, i.e. deductions, will not work as an alternative tax incentive instrument, as they are more appropriate for businesses than for individuals.

Although zero rating is not the most effective tool for promoting tax equality or altering behaviour, it has a significant impact on the country's citizens. Based on the analysis of alternative tax incentive instruments, the authors of this paper submit that zero rating is the best instrument for South Africa if implemented alongside industry regulation. The zero rating of a broader range of renewable energy, i.e. including inverters, PV solar lights and rental services of solar systems, will result in immediate savings for consumers and will benefit all South African citizens, thereby achieving equity. This recommendation is supported by global trends, such as the European Union's preference for zero rating of solar PV panels installed by individuals. Zero rating results in immediate relief for encouraging renewable energy investment. Thus, zero rating is the most equitable instrument in answer to the research question.

If an equitable tax policy is to be adopted to encourage individuals to invest in or consume green energy, the solution is to zero-rate these products and services used and consumed by individuals while regulating the industry. This will assist in keeping the lights on!

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Literature Review: Artificial Intelligence Adoption Within the Accounting Profession Applying the Technology Acceptance Model (3)

Kenneth Kayser and Arnesh Telukdarie

Abstract The rapid advancements in artificial intelligence (AI) technologies have significantly impacted various industries, including the accounting profession. This paper examines the adoption of AI in the accounting profession using the Technology Acceptance Model (TAM) as a framework. The TAM provides a theoretical foundation to understand the factors influencing the acceptance and adoption of AI in accounting, including perceived usefulness, perceived ease of use, attitudes towards AI, and external factors. The paper also discusses the implications of AI adoption for accountants and the challenges associated with integrating AI into accounting practices. Finally, recommendations are provided to facilitate successful AI adoption in the accounting profession.

Keywords Artificial intelligence · Technology Acceptance Model (TAM 3) · Accounting · Technology · ChatGPT · Innovation · Digitisation

1 Introduction

In the words of David Lochhead "We create machines in our own image, and they in turn, recreate us in theirs." (Bozkurt et al., 2023). These words resonate as generative Artificial intelligence (AI) goes mainstream impacting a number of industries. AI has many applications as demonstrated in Fig. 1. The research article focuses on AI application adoption within the accounting profession. AI application adoption comes with both benefits as well as implications, thus the accounting profession now has the ability to leverage AI in ways that move the industry forward while also putting in place guardrails to protect against the negative implications.

Artificial intelligence (AI) by its definition pertains to the application of science and engineering to making machines intelligent (Sutton, 2020). AI has many applications and relevancies to many industries, one industry that lacks adequate

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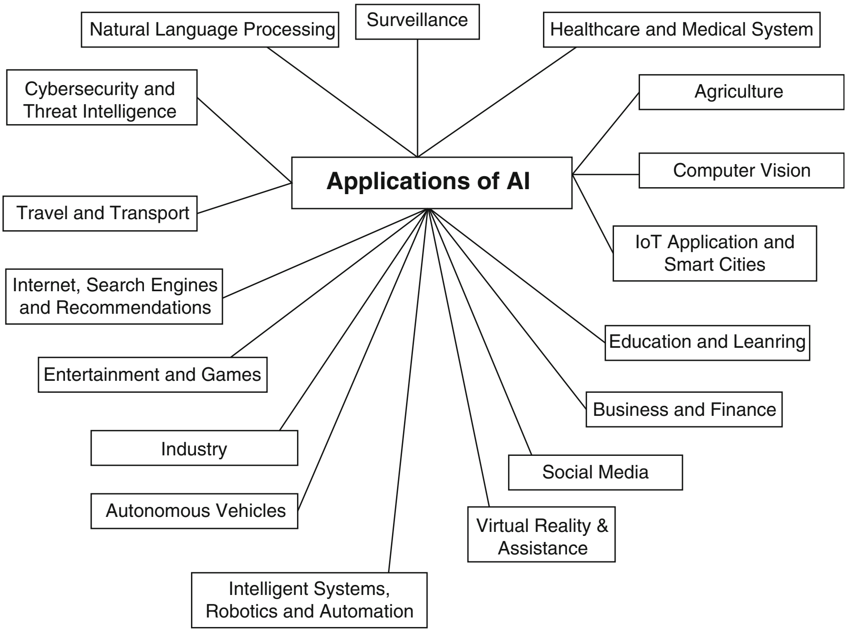

Fig. 1 Several potential real-world application areas of artificial intelligence (AI). Source: As adapted from Sarker, I.H. (2022)

research is in the accounting industry. Many manual activities completed by human resource capabilities like accountants, auditors and bookkeepers are now being augmented by applications like startup OpenAI's ChatCPT (Jammalamadaka & Itapu, 2022). This research focuses on the literature gap that exists on research pertaining to AI and its implications for the accounting industry. Implications include both positive (Mikalef & Gupta, 2021), and negative (Abousaber & Abdalla, 2023).

The accounting profession has witnessed transformative changes due to technological advancements, and AI has emerged as a powerful tool with significant potential to revolutionize accounting practices. This paper explores the adoption of AI in accounting by applying the Technology Acceptance Model (TAM) to understand the factors that influence the acceptance and integration of AI technologies (Jammalamadaka & Itapu, 2022).

2 Literature Review

Agarwal and Gaur (2020) affirmed that artificial intelligence has quickly emerged as a disruptive force in the accounting field, transforming how accounting tasks are performed, from simple data entry to complex analysis, resulting in significant benefits for businesses. Zhang et al. (2019) asserted that artificial intelligence is a fast-growing technology that has the potential to revolutionise several industries, including accounting. Artificial intelligence can automate monotonous tasks, improve decision-making processes, and provide considerable insights that can lead to enhanced performance. There are several applications of artificial intelligence in accounting, such as automated data entry, financial statement analysis, fraud detection, and tax planning and compliance. Artificial intelligence-powered systems can automate data entry tasks, reducing the need for manual input and minimising the risk of errors.

Additionally, AI systems can analyse financial statements, identify trends and patterns, and provide insights that can assist accountants in making informed decisions. Moreover, AI systems can analyse large amounts of financial data and identify potential fraud, allowing accountants to investigate and take appropriate action. On the other hand, AI systems can guide compliance with tax laws and regulations and identify opportunities to reduce tax liabilities. In the past, accounting tasks were carried out manually, which was time-consuming and error prone. However, with the advent of AI, accountants can leverage advanced technologies to automate their tasks, reduce errors, and increase efficiency (Hasan, 2022).

In accounting, artificial intelligence can be traced back to the 1950s, when computers were first used to automate routine accounting tasks. The advent of accounting software in the 1970s allowed accountants to automate bookkeeping tasks. However, these systems lacked intelligence and could not provide meaningful analysis and insights (Agarwal & Gaur, 2020). In the 1980s, expert systems were introduced using artificial intelligence to replicate human experts' decision-making abilities. Expert systems rely on rule-based approaches to accounting, where a set of predefined rules is used to make decisions (Vărzaru, 2022). In the 1990s, neural networks and fuzzy logic were used in accounting, which provided more flexibility and could learn from data, leading to more accurate decisions. However, these systems still had limitations in analysing large amounts of data (Agarwal & Gaur, 2020).

In the 2000s, the emergence of machine learning and natural language processing revolutionised accounting. Machine learning algorithms could analyse vast amounts of data, learn from it, and make predictions. Natural language processing enabled computers to understand and interpret human language, automating tasks such as financial reporting (Agarwal & Gaur, 2020). Recent technological advancements have enabled accountants to process large amounts of data, analyse it in real-time, and provide valuable insights to businesses, making the current use of AI in accounting possible (Agarwal & Gaur, 2020). Iterated that artificial intelligence has advanced significantly in accounting, from automating simple tasks to performing complex analyses and predictions. Technological advancements in expert systems, neural networks, fuzzy logic, and machine learning have driven the development of artificial intelligence in accounting. Big data analytics, cloud computing, and the Internet of Things have also contributed to the current use of AI in accounting. These technological developments have transformed accounting, improving efficiency, accuracy, and decision-making. Accountants must embrace artificial intelligence technology to remain relevant in a digital economy (Askary et al., 2018; Chu & Yong, 2021; Luo et al., 2018; Berdiyeva et al., 2021).

Zhang et al. (2019) explained that using artificial intelligence (AI), machine learning, and natural language processing tools to automate accounting allows accountants to make better decisions. As a result, the employment of artificial intelligence hastens the process by which accounting systems become more integrated with intelligent logic. For the same reason, investigating how artificial intelligence can improve impact accounting makes logical. This article aims to provide an overview of the adoption of artificial intelligence in accounting through the lens of the Technology Acceptance Model, emphasising its usefulness via use cases identified as well as highlighting AI's potential benefits and the obstacles it encounters. This article is divided into six sections, the third of which describes the study's methodology, and the fourth presents and examines the findings. The fifth section of this article presents the adoption of AI in the accounting industry through practical demonstration of AI tools developed by startups, and the sixth section discusses the practical uses of AI in the accounting industry by platforms like OpenAI's ChatGPT. The conclusion and summary are delivered in section seven.

3 Research Methodology

The Technology Acceptance Modelling (TAM 3) research methodology approach was applied as it provides a theoretical foundation to understand the factors influencing the acceptance and adoption of AI in accounting, including perceived usefulness, perceived ease of use, attitudes towards AI, and external factors. The study focuses on the two main attributes perceived usefulness and perceived ease of use as these form part of a user's intention that then changes one's behaviour towards a technology and in this instance key adoption drivers for AI tools in the accounting profession Davis et al. (1989) (Fig. 2).

3.1 Why the Technology Acceptance Model (2) Was Considered

Technology like AI is gaining wide spread adoption due to the perceived usefulness as well as ease of use identified across different industries and the accounting industry is no different. Accounting professionals can now leverage AI to help them analyse and report on financial transactions in a more meaningful manner for example, for financial forecasting more robust models can be built using AI that can take into consideration variables not initially or not thought of by accounting professionals but due to AI having access to a wide dataset it can provide insights on

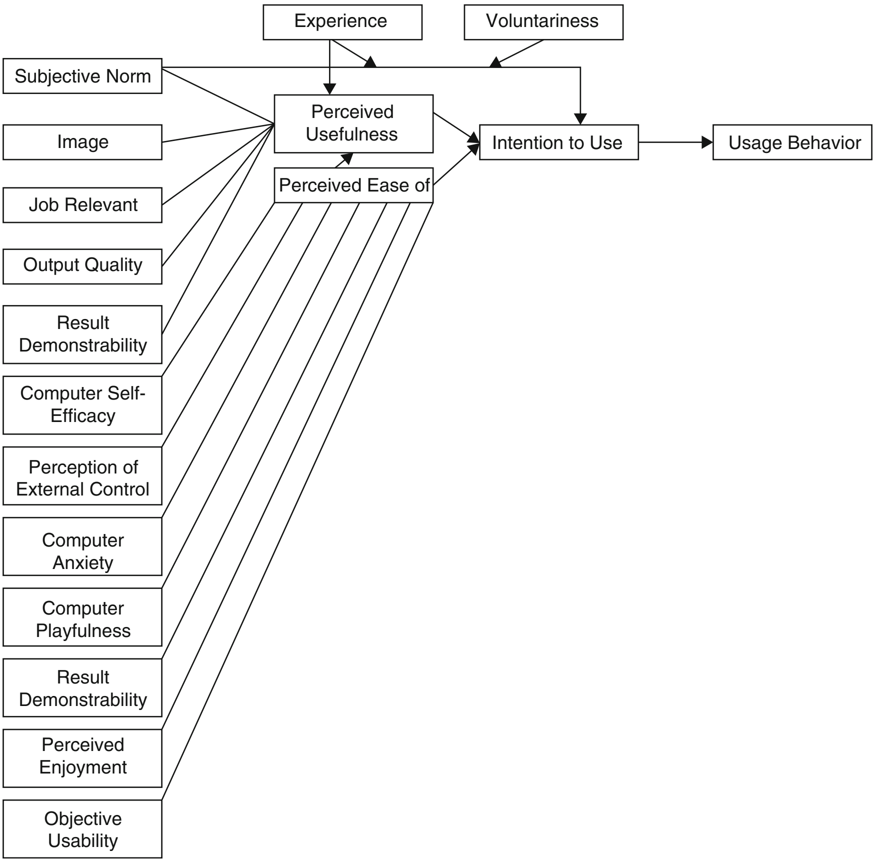

Fig. 2 Technology Acceptance Model 3 (TAM 3). Source: As adapted from Venkatesh and Bala (2008)

variables used in financial forecasting that it comes across during analysis of prior work done.

The TAM model is appropriate for this study as it is relevant in articulating the adoption AI tools that assist accounting professionals save time. With use cases like the automation of financial statement preparation and reporting and AI tools like Glean AI is an AI-powered tool for accounts payable, aimed at helping finance teams save time and make better spending decisions. The acceptance of AI automation tools in the accounting profession demonstrates the preserved usefulness and perceived ease of use (as noted in the TAM model) (Venkatesh & Bala, 2008).

Error Identification and Handling: Accounting professionals can now make use of AI tools to identify errors in its financial transactions and statements as these can be uploaded into AI tools thus also sharing recommendations on these errors identified. The TAM model makes reference of output quality as a variable in the model. Error identification and handling during the financial preparation and reporting process are areas that require addressing thus AI tools make this possible by assisting accounting professionals (Tater et al., 2022).

4 Findings and Discussions

Askary et al. (2018) emphasised the importance of reliable accounting information, which may be achieved by establishing robust internal control systems. The accounting profession relied on time-consuming, error-prone manual operations for a long time. As a result, whether organisations produce excellent or low-quality accounting information is mainly on their internal control systems. According to Askary et al. (2018), having competent management and auditors who analyse the company's financial reporting is necessary for strengthening a company's internal control systems. Findings of various studies (Askary et al., 2018) suggest that employing modern technology, such as artificial intelligence, to address weaknesses in internal accounting control systems would be prudent. By eliminating asynchronous data, digital technologies could increase the quality of decision-making, transparency, and the speed of intra- and inter-organisational communication. This could enable accountants to focus on high-benefit activities such as analysis, problem-solving, decision-making, strategy development, and leadership (Vărzaru, 2022).

The TAM is a widely recognized theoretical model that explains technology acceptance and adoption. It consists of two key factors: perceived usefulness and perceived ease of use. The study revealed use cases pertaining to error identification, handling time as well saving during the financial preparation and reporting processes. These two use cases speak to the perceived usefulness and perceived ease of use variables as noted in the TAM model. These factors influence an individual's attitude toward using technology, ultimately impacting their intention to adopt it. The TAM also considers external variables that influence the acceptance and adoption of AI in the accounting profession Tater et al. (2022).

The scope of the study was limited to these two main factor attributes of the TAM model (perceived usefulness and perceived ease of use) and adoption use cases around these attributes as these are the driving forces behind adoption of AI in the accounting profession (Venkatesh & Bala, 2008).

4.1 Benefits of Artificial Intelligence Adoption in the Accounting Profession

Accounting functions such as data input, bookkeeping, financial analysis, compliance monitoring, and cost analysis have been automated, thanks to technological advances. As a result, artificial intelligence (AI) has reduced the likelihood of errors, increased efficiency, increased accuracy, and provided substantial insights and recommendations for better decision-making. One of the primary advantages of AI in accounting is automated data entry and bookkeeping. Proposed that AI might input massive volumes of data quickly and reliably, reducing the likelihood of errors and freeing up time for other essential tasks. Data input and bookkeeping automation can save an accountant significant time.

Additionally, artificial intelligence-powered software may analyse financial data, provide insights and recommendations, and proactively detect errors or inconsistencies. This technology allows accountants to make better-informed decisions faster and improve financial performance. Furthermore, AI can improve compliance by automating the process of monitoring and identifying any regulatory issues by analysing financial records for possible fraudulent behaviour or noncompliance with applicable laws. It can also ensure that financial reports are accurate and follow applicable standards, lowering the risk of fines or legal action.

Artificial intelligence is frequently used in robot design, development, and deployment. For example, when robots are combined with human interfaces, the need to change programmes (software store, accounting, and payroll) and the core infrastructure of information technology is eliminated (Berdiyeva et al., 2021). Each robot is logged and monitored to meet audit criteria and ensure data integrity. Software robots, for example, can perform routine labour tasks such as opening, reading and sending emails. Furthermore, robots can process information, format it, decide whether it is accurate, and make decisions (Berdiyeva et al., 2021). For instance, the TICOM model was developed to aid auditors in planning, analysing, and reviewing internal control systems for decision support assistance. The auditor uses the querying function after utilising TOCOM to model the information system to test the effectiveness of the internal control system (Berdiyeva et al., 2021).

Baldwin et al. (2006) asserted that the current audit and assurance environment is the most essential component of the accounting profession. For example, audit results show a high rate of audit failures, which has substantial financial implications; as a result, the government and professional bodies adjust the regulations, rules, and training for accountants, which can lead to problems (Baldwin et al., 2006). Chu and Yong (2021) suggested that artificial intelligence might solve the problem because it incorporates big data analytics, which can assist auditors in focusing their efforts more effectively on exception reporting by detecting outliers throughout the audit. Furthermore, data analytics can help auditors improve the risk assessment process by implementing meaningful procedures and control tests (Chu & Yong, 2021). When auditing a client, for example, a well-designed machine-learning algorithm can make it easier to detect potentially fraudulent transactions in a firm's financial statements (Chu & Yong, 2021). This is possible because machine-learning algorithms have been trained to recognise such transactions. Another advantage of big data and AI can undertake predictive analysis. This form of analysis helps accounting and auditing professionals understand the future by identifying trends in data acquired in the past. In accounting, for example, predictive analysis is used to generate the credit score, which predicts the likelihood of making future credit payments on time (Baldwin et al., 2006; Chu & Yong, 2021). Finally, yet importantly, auditors and accountants can use AI to create data visualisations from a single Excel graph. These visualisations can then be combined with other vital data to generate dashboards, which allow many pieces of information to be examined simultaneously (Chu & Yong, 2021).

Although AI technology offers excellent benefits to the accounting industry, such as increased efficiency, accuracy, and automation of traditional activities that help reduce costs and improve the overall accounting profession, Artificial intelligence also presents some drawbacks or challenges. Furthermore, AI opens new career opportunities for data analysts, data scientists, and software developers. These positions are critical in developing AI-driven solutions to the challenges the accounting industry is now facing. However, it is critical to remember that artificial intelligence is a technology that will assist accountants rather than replace them. Human skill and judgement are still vitally crucial in accounting; nevertheless, as AI technology advances, we can predict increasingly complicated uses of AI in this field.

4.2 Challenges of Artificial Intelligence Adoption in the Accounting Profession

Despite the numerous benefits, the adoption of AI in accounting also faces challenges and barriers. This section discusses these drawback issues. Several drawbacks affect the application and implementation of AI in the accounting firm. First, AI has been used in several industries, including banking, agriculture, mining, and manufacturing. Generally, the use of artificial intelligence in the accounting industry is in its infancy (Luo et al., 2018), implying a lack of experience. Luo and co-authors claimed that the application of automation is premised mainly on financial reporting, neglecting core areas of accounting such as financial analysis, and has not yet impacted the change of accounting standards. Luo and co-authors believe that if AI is implemented in the accounting industry, it should cover almost all aspects of traditional accounting, including the formation of accounting information, report generation, and decision-making (Shaffer et al., 2020). Generally, this suggests that AI's capabilities in the accounting industry require further development of use cases across the financial preparation and reporting spectrum. AI tools due to their perceived ease of use and value will make this spectrum adoption possible over time. Goh et al. (2019).

Second, implementing AI requires high investment with slow returns at the beginning (Shin, 2021). Therefore, firms should be ready to invest substantial capital in the long term. In addition, introducing AI requires adjustment to the daily operations of a firm, which affects human resource management through job displacement. It is prudent that decision-making to introduce AI in the accounting industry should be long-term than short-term (Luo et al., 2018). Third, the quality of professionals' talents needs to be improved, requiring re-skilling or upskilling of a firm's staff to be able to use the introduced technology. Other employees who cannot be upskilled might lose their jobs (Zhang et al., 2023). For example, digital skills shortages are a salient problem in South Africa. Smith (2023) elucidated that a recent ICT survey shows South Africa has a skill shortage of approximately 77,000 high-value technology jobs. This dictates that the accounting profession does not need professional accounting knowledge, but digital skills are also required. Developed countries encourage accounting professionals to enroll for a dual degree, including artificial intelligence. Other challenges facing AI adoption include the following:

- *Market Understanding*: The lack of awareness and understanding of AI technology. Many businesses, especially small and medium-sized enterprises, are unaware of AI-powered accounting solutions' benefits. Therefore, businesses need to be educated on the benefits of AI technology and how it can help them improve their accounting processes.
- *Data privacy and security:* AI-powered solutions rely on large amounts of data to function effectively raises concerns about data privacy and security. Therefore, firms must ensure that their solutions comply with data protection regulations and implement robust data security measures to protect their clients' data.

Although AI provides more benefits to drive adoption with perceived usefulness and ease of use, such as efficient and effective analysis, regulators have detected an ethical risk associated with AI implementation (Zhang et al., 2023). First, artificial intelligence (AI) lacks transparency, which refers to the openness and clarity of AI's decision-making processes and algorithms. Accounting artificial intelligence must ensure its algorithms and decision-making processes are explainable and transparent. Holding AI systems accountable for their decisions can be challenging, especially if the system is opaque. In a white paper, "A European Approach to Excellence and Trust," published in 2020, the European Commission (2020) called for greater openness and transparency in artificial intelligence decision-making processes. Jammalamadaka and Itapu (2022) raised the importance of explainable AI in work in the context of maintaining accountability and transparency. Second, objectivity is critical ('systematic errors in AI algorithms that result in unequal treatment of different populations'). Jammalamadaka and Itapu (2022) added that artificial intelligence in accounting must ensure that its algorithms are free of bias and do not perpetuate discrimination or unfairness.

Additionally, Jammalamadaka concluded that artificial intelligence (AI) algorithms used by credit scoring firms are biased against some groups, mainly persons with low incomes or no credit history. As a result, various groups may be treated unequally. This has implications for the accounting profession, meaning that data relevant to specific groupings reported on for financial reporting purposes cannot be biased. Third, trustworthiness should be maintained, referring to the algorithms developed by firms to be accepted based on the output or outcome of the activity completed. Trust in the accounting profession is vital as the financial results processed must be able to be specified, measured, monitored, and evaluated by others in ways that direct them toward the achievement of desired objectives. AI firms need to develop platforms that align with acceptable moral behaviour that can be accepted. Other ethical concerns regarding AI include result distortion, accessibility, expectation gap, and competence of developers (Zhang et al., 2023).

5 Adoption Driven by Startups

Several AI start-up companies are driving adoption in the accounting profession by developing AI-powered solutions that offer value and are easy to use. MindBridge AI provides a technology powered by AI that can detect fraudulent conduct in financial transactions. Because the platform uses machine learning algorithms for data analysis and identifying suspicious transactions, auditors can focus their attention on high-risk areas (Alshurafat, 2023). Furthermore, MindBridge AI has been recognised as one of the premier AI start-ups in the accounting business, for which it has received many awards and accolades. Accounting operations such as invoicing, bill payment, and bank reconciliation may all be automated with the help of AI in Xero. The software uses Machine learning algorithms, which learn from user behaviour and suggest improvements. As a result, firms can improve the accuracy of their accounting operations while streamlining them. Botkeeper is an artificial intelligence-powered bookkeeping service that provides businesses with an automated solution. The platform uses machine-learning algorithms to identify transactions, reconcile accounts, and generate financial reports, saving businesses time and reducing the possibility of errors.

The AppZen platform is an AI-powered system that automates expense reporting and audits. According to, the platform examines cost records to identify the risk of fraudulent behaviour, mistakes, or violations of business policy. AppZen has received numerous awards and recognitions, including being named one of the most successful AI start-ups in the accounting business. Canopy has created an AI-powered platform streamlines tax preparation and filing (Lehner & colleagues, Lehner et al., 2022). The platform uses machine learning algorithms to extract document data and automate tax preparation. This allows organisations to save time while also lowering the risk of errors. Receipt Bank is a new start-up that has created software to automate data entry and receipt administration. Receipt Bank is the name of the product. Receipt Bank minimises manual data input by applying artificial intelligence (AI) technology to extract data from invoices and receipts, eliminating the need for such entry. This allows accountants to focus on more strategic operations.

Below is figure that links AI adoption attributes or drivers as per TAM 3 to actual adoption use cases with the AI solutions developed by startups (Fig. 3).

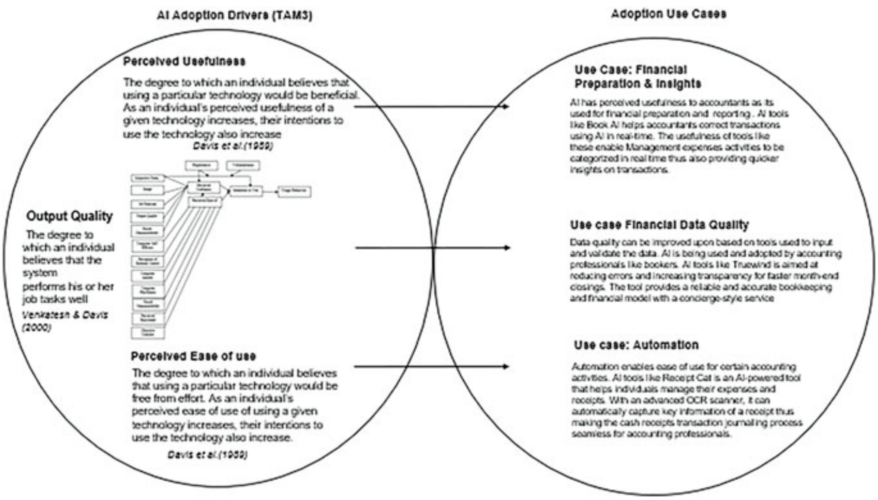

Fig. 3 Technology Acceptance Model 3 (TAM 3) and Adoption Use Cases. Source: Venkatesh and Bala (2008)

5.1 *Perceived Usefulness*

If we look at TAM 3 attribute Perceived Usefulness which is classified as the degree to which an individual believes that using a particular technology would be beneficial. As an individual's perceived usefulness of a given technology increases, thus their intentions to use the technology also increase. Now for this attribute use cases pertaining to financial preparation and insights come to mind. AI tools like Book AI helps accountants correct transactions using AI in real-time. The usefulness of tools like these enables Management expenses activities to be categorized in real time thus also providing quicker insights on transactions. This then drives greater adoption as it serves a useful purpose within the management accounting domain (Venkatesh & Bala, 2008).

5.2 *Output Quality*

If we look at a contributing attribute to Perceived Usefulness, Output Quality. This refers to the degree to which an individual believes that the system performs his or her job tasks well. This results in better or improved quality of data and reporting. Use cases like financial data quality comes to mind. Data quality can be improved based on tools used to input and validate the data. AI is being used and adopted by accounting professionals like bookers. AI tools like Truewind is aimed at reducing errors and increasing transparency for faster month-end closings. The tool provides a reliable and accurate bookkeeping and financial model with a concierge-style service (Venkatesh & Bala, 2008).

5.3 Perceived Ease of Use

This refers to the degree to which an individual believes that using a particular technology would be free from effort. As an individual's perceived ease of use of a given technology increases, their intentions to use the technology also increase. Now, when it comes to use cases from an accounting perspective, automation enables ease of use for certain accounting activities. AI tools like Receipt Cat is an AI-powered tool that helps individuals manage their expenses and receipts. With an advanced OCR scanner, it can automatically capture key information of a receipt thus making the cash receipts transaction journaling process seamless for accounting professionals (Venkatesh & Bala, 2008).

6 ChatGPT Driving Adoption of AI in the Accounting Industry

The ChatGPT is a language model created by Open AI. ChatGPT, an Open AI large language model, is regarded as one of the accounting industry's most promising artificial intelligence solutions. This model can potentially revolutionise how the accounting industry operates dramatically. Alshurafat (2023) confirmed that ChatGPT could understand natural language questions and provide accurate responses, which can aid in the simplification of accounting processes and the improvement of operational effectiveness. Furthermore, some potential challenges during ChatGPT implementation and solutions are studied and presented. Accounting has long been known for the arduous and time-consuming tasks that its practitioners must perform, such as compiling tax returns, financial reports, and audits. However, the adoption of AI has the potential to make the sector more productive and successful. Alshurafat (2023) added that ChatGPT benefits accountants and other financial specialists since it can read natural language queries and provide relevant answers:

- *Data Analysis*: Accountants need to analyse large amounts of data to identify trends, patterns, and anomalies affecting financial decisions. ChatGPT can help accountants with this task by providing quick and accurate answers to queries about financial data if the financial dataset has been integrated with ChatGPT. This can be done by the accountant uploading financial data sets to ChatGPT and requesting for analysis.
- *Automation:* Many accounting tasks, such as data entry and record-keeping, are time-consuming and repetitive. ChatGPT can automate these tasks by processing

and categorising financial data, generating reports, and even sending reminders to clients about upcoming payments if ChatGPT has access to the financial data that requires automation (Lehner et al., 2022). This can allow accountants to focus on more complex tasks, such as financial planning and analysis.
- *Customer Service:* ChatGPT can help improve customer service by providing quick and accurate responses to client queries. Clients can ask ChatGPT about their account balances, payment due dates, and financial planning advice. ChatGPT can provide real-time answers, reducing clients' need to wait for a human representative to respond. Again, it depends on ChatGPT's access to the dataset.

With the assistance of ChatGPT, a robust tool, the accounting business can become more productive and efficient. Its ability to understand inquiries in straightforward language and react with correct facts makes it valuable for accountants and other financial professionals (Bertino et al., 2021). ChatGPT can help accounting firms stay competitive in a rapidly changing sector by improving data analysis, automating repetitive tasks, and providing extraordinary customer service. Although there are hurdles to implementing it, they may be addressed with good planning and implementation. As AI continues to advance rapidly, ChatGPT has the potential to become a critical tool for individuals working in the accounting industry.

On the other hand, ChatGPT presents some drawbacks, including ensuring the accuracy of the responses provided by ChatGPT. Accountants must be confident that the responses are correct and can be relied on Alshurafat (2023). Another challenge is ensuring the security of financial data. Therefore, ChatGPT must be integrated into a secure system that protects client data from unauthorised access.

7 Summary and Conclusion

The adoption of AI across the accounting activity spectrum appears to have a promising future, with numerous opportunities for growth and innovation. Prior, accounting has always been done manually, which is a time-consuming, error-prone, and inefficient process. However, the emergence of AI has drastically transformed the accounting environment, allowing accountants to automate their labour and focus on more strategic pursuits (Zhang et al., 2019). Adopting AI technology in accounting is expected to offer new opportunities for accountants. Alshurafat (2023) asserted that AI firms in accounting had used technology to create unique solutions to industry problems. According to Alshurafat (2023) these firms drive accounting industry innovation by developing artificial intelligence (AI)-powered software that automates accounting tasks, increases accuracy and improves decision-making. Added that artificial intelligence technology could assist accountants in providing clients with extra value-added services such as business forecasting, risk management, and strategic planning.

The study's key findings show that the adoption of AI platforms can benefit the accounting profession by automating data input, bookkeeping, expense reporting, auditing, detecting fraudulent activity in financial transactions, tax preparation, filing, and financial analysis. Accounting professionals make use of these AI tools to save time and money. Furthermore, artificial intelligence creates new employment options in accounting, such as data science, software development, and machine learning. According to the study's major findings, ChatGPT can communicate with clients via chatbots powered by artificial intelligence. Even though AI has limits, the benefits now outweigh the drawbacks.

In conclusion, the accounting profession will continue to benefit adoption of AI solutions because these solutions increase productivity by automating specific tasks and responsibilities traditionally performed by accountants and bookkeepers which aligns to the TAM model attributes of perceived usefulness and ease of use. The profession will see cost savings while compiling specific financial statements and documentation. AI solutions also aid decision-making by utilising datasets on which machine learning capabilities can be constructed, supporting accountants with financial decisions. This is performed by utilising machine learning. As the accounting industry continues to embrace artificial intelligence technology, AI is expected to eventually become an integral component of accounting practices, ushering in major and exciting developments. It is critical to remain vigilant about the ethical implications of using AI in the accounting industry.

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The Role of Self-Determination Theory on Information Technology Skills of First-Year Trainee Accountants

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Abstract Rapid advancement in Information Technology (IT) has changed how accountants acquire, analyse and interpret data to inform organisational decision-making. The key trends in IT have meant that tasks traditionally performed by early-career accountants are now automated. The problem identified in this study is that new accounting graduates often struggle with IT challenges in the workplace. Despite these challenges, they still succeed in their training programs. This study examines the role of Self-determination Theory (SDT) on the IT skills of first-year trainee accountants. It identifies the knowledge gaps between accounting education and IT skills required to perform accounting duties in the workplace. The study adopted a qualitative research approach. Through face-to-face interviews, data were purposefully collected at a point of saturation from accounting firm managers and first-year trainee accountants. Data were analysed using the ATLAS.ti™ 9 software package and thematic data analysis. The findings of this study indicate that with self-determination, first-year trainee accountants can overcome IT challenges such as sophisticated software packages, technological stress and meeting employers' expectations. This study outlined the concepts that evolved around self-determination and how trainee accountants practice self-determination in order to overcome IT-related challenges. The study was limited to accounting firms in the Mafikeng area in the North West Province of South Africa. The findings of this study provide valuable insights for accounting education, accounting professional bodies, accounting firms, and other stakeholders with various IT challenges first-year trainee accountants face and how self-determination is practised to overcome these challenges.

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1 Introduction

Rapid technological developments across the globe have resulted in a significant increase in the use of information technology (IT) in accounting firms (Selamat & Idris, 2019). The high rate of IT adoption among accounting functions is due to the urge for improved productivity among accounting professionals (Gary & Poh-Sun, 2016). Accounting firms are now investing in auditing software and knowledge-sharing applications to enhance financial data gathering, organisation, processing, evaluation, and presentation (Gary & Poh-Sun, 2016; Han et al., 2023). According to Ghasemi et al. (2011), computerized accounting systems and IT have given the accounting profession a number of skills, including increased functionality, quicker processing, improved accuracy, and external reporting. The working settings of accountants nowadays are altering as a result of IT advancements (Kroon et al., 2021). Ghasemi et al. (2011) further points out that modern accounting software systems have automated the use of paper ledgers and accounting books, which has shortened the time required for accountants to execute their jobs and improved the overall accuracy and efficiency of accounting data. The development of IT tools has improved the accuracy and timeliness with which accountants can now compile and present financial reports (Imene & Imhanzenobe, 2020).

The accounting industry has urged accountants to develop their abilities by integrating IT features when carrying out their duties in their corporate operations, according to Kroon et al. (2021). In its competency framework for first-year trainee accountants, the South African Institute of Chartered Accountants (SAICA) has repeatedly emphasized the value of technical expertise and IT (Kunz & De Jager, 2019; Stumke, 2017). The most recent competency framework (SAICA, 2021) emphasizes the necessity of aligning professional values and attitudes with technical and technological abilities as well as enabling skills. Previous studies in accounting education have demonstrated that businesses place a higher value on IT abilities than what accounting graduates possess (Edeigba, 2022; Kwarteng & Mensah, 2022). According to Kwarteng and Mensah (2022), accounting graduates had developed two-thirds of the 18 skills employers considered essential to the accounting profession with IT skills, constituting the remaining one-third of the essential skills.

Most early-career trainee accountants struggle with IT use when they begin working at an accounting office because they lack the necessary IT skills and expertise (Kroon et al., 2021; Kunz & De Jager, 2019). This scenario is made worse by the fact that South African trainee accountants are expected to be accountable for their own competency and skill development (SAICA, 2020b). Therefore, it is the trainee accountants' responsibility to make every effort to get through whatever IT obstacles they face. The use of complex software programs, technological stress, living up to employer expectations, and family and psychological difficulties may all be part of these difficulties (Papagiannidis et al., 2020).

2 Problem Statement and Objectives of the Study

Despite the emphasis on developing IT skills in accounting education, new accounting graduates often struggle with IT challenges in the workplace. Stumke (2017) and Junger da Silva et al., 2021concur that the various IT challenges encountered by trainee accountants are due to inadequate integration of IT programmes in accounting education institutions and limited collaboration between universities and accounting firms. This lack of training for aspiring accountants is a major worry, especially in South Africa, where embracing new technologies is essential for competitiveness and economic progress. Despite the fact that trainee accountants must gain a variety of skills in order to meet SAICA (2020b) criteria, they are nevertheless required to take responsibility and show that they possess (or are acquiring) the relevant abilities and skills. The issue found in this study is that recent accounting graduates frequently encounter IT difficulties at work. They nevertheless succeed in their training regimens despite these obstacles.

Therefore, the purpose of this research was to investigate the role of self-determination in the context of IT challenges faced by first-year trainee accountants in South Africa and to explore how it can improve their engagement and performance and motivate them in dealing with IT challenges. In addition, this study seeks to answer the question, "What role does self-determination play when first-year trainee accountants encounter IT challenges in the workplace?" Hence, the research objective is to determine the role of self-determination plays when first-year trainee accountants encounter IT challenges at the workplace.

3 Theoretical Framework

Self-determination Theory (SDT) is a well-established motivational theory that provides a framework for understanding individuals' intrinsic motivation and the role of their social environment in supporting or undermining this motivation (Deci & Ryan, 2013; Duda & Appleton, 2016). The theory posits that individuals have three basic psychological needs: autonomy, competence, and relatedness, which are essential for intrinsic motivation and well-being (Ryan & Deci, 2017).

An individual's sense of control over their actions and decisions is referred to as autonomy. A person's perception of mastery and efficacy in their activities and the work at hand are referred to as their level of competence. According to Martela and Riekki (2018), relatedness is a person's sense of connection, belonging, and pleasant relationships with others.

Vergara-Morales and Del Valle (2021) contend that when people's fundamental psychological needs are met, they are more likely to be intrinsically driven, which improves performance, perseverance, and overall wellbeing. However, when these requirements are not addressed, people may turn to extrinsic motivation, which can have negative effects on their performance and general well-being (Vo et al., 2022).

SDT can be used to explain how the satisfaction of autonomy, competence, and relatedness needs can enhance first-year trainee accountants' intrinsic motivation in dealing with IT challenges encountered in the workplace. The framework can also identify factors in the social environment that support or undermine the satisfaction of these needs, such as workplace culture, supervisor support, and colleague interactions. By understanding how SDT can be applied in the context of IT challenges, the theoretical framework can inform interventions and strategies that enhance trainee accountants' motivation and engagement in dealing with IT challenges, ultimately improving their job performance and career prospects.

4 Research Methodology

This study adopted a qualitative research approach to obtain information in order to achieve the research objectives. The qualitative research approach relies on understanding the problem by investigating the participants' perceptions, experiences, and views (Queirós et al., 2017). These approaches include interviews, observations, and open-ended questionnaires. In this study, a qualitative research approach enabled the researcher to understand the experiences of the trainee accountants as they were responsible for developing their IT skills. In addition, qualitative research was considered an appropriate method because it allowed the researcher to obtain rich perceptions from trainee accountants in their natural settings. Moreover, this assisted the researcher in answering the study's research question.

All SAICA training offices in the Mafikeng region were chosen for the study using a census or total sampling method. As of July 2021, there are four SAICA training offices in Mafikeng (SAICA, 2020a). According to Maree (2014), a research population needs to be practical and appropriate. All first-year trainee accountants and their respective managers from the four designated SAICA training offices were the study's target demographic in terms of participants. 13 first-year trainees (shown as T1-T13) and two managers (represented as M1-M2) took part in the study to reach a point of saturation. This study adopted individual interviews as a data collection technique. The researchers used face-to-face interviews to obtain an in-depth understanding of how self-determination helped them overcome the challenges. In addition, the researcher used an interview schedule, which guided the interview process.

An expert transcriber initially converted the audio files from the interviews' material into text. After that, the data were thematically analysed using the ATLAS.tiTM 9 tool with the help of an Independent Coder (IC). The researcher carefully reviewed the transcript data using thematic data analysis to spot recurring themes, subjects, concepts, and patterns of meaning. The software tools in ATLAS. tiTM 9 manage cognitive, thought-based, and manual processes associated with coding the data. The IC read the transcripts as part of the pre-coding process before continuing down the theoretical coding path.

5 Results and Discussion

The purpose of this research was to investigate the role of self-determination in the context of IT challenges faced by first-year trainee accountants in South Africa and to explore how it can improve their engagement and performance and motivate them in dealing with IT challenges. Figure 1 depicts the findings, which include eager to learn, enhanced work relationships, and motivation.

5.1 Eagerness to Learn

According to comments taken from study participants, self-determination is essential for inspiring first-year trainee accountants to handle IT issues they face at work. The motivation of the trainee accountants is motivated by a variety of variables, including the urge to accomplish their desired goals, fulfil job requirements, and improve their IT proficiency. First-year trainee accountants that are self-driven and keen to learn any challenging IT skills essential to perform their duties. SDT is based on the idea that despite obstacles, people have a persistent desire to learn (Deci & Ryan, 2012; Guay, 2022). The competency of trainee accountants can be improved with the help of accounting professional bodies and accounting businesses.

Participant T7 highlighted the importance of honesty and focus in achieving desired goals, suggesting that trainee accountants must be committed to achieving their objectives. This comment underscores the significance of autonomy and competence needs in SDT, emphasising individuals' sense of control and mastery over their actions and decisions (Ryan & Deci, 2000).

> T7: Yes, I was really focused and dedicated, and being honest with yourself is the first step. You must accept responsibility, be truthful and sincere, and keep your attention on your intended outcomes.

The comment from T1 emphasised the consequences of not getting things done correctly, highlighting the external pressures that can drive determination. This comment underscores the role of external factors in SDT, which acknowledges that social context and external factors can influence individuals' motivation and engagement (Deci & Ryan, 2013).

> T1: Yes, I was really determined because if I did not get something done, my manager would not give me another job, so I ensured that I got things done and did it correctly.

Participant T2 explained:

> T2: I think I was determined because my career requires these IT skills in order to qualify as an accountant. So, I think it helped me not to give up until I achieved that goal.

According to the findings presented above, first-year trainees used the notion of self-determination to solve their IT problems. They were eager to acquire the necessary IT skills and excel at their jobs. Participant T3's comments emphasized the

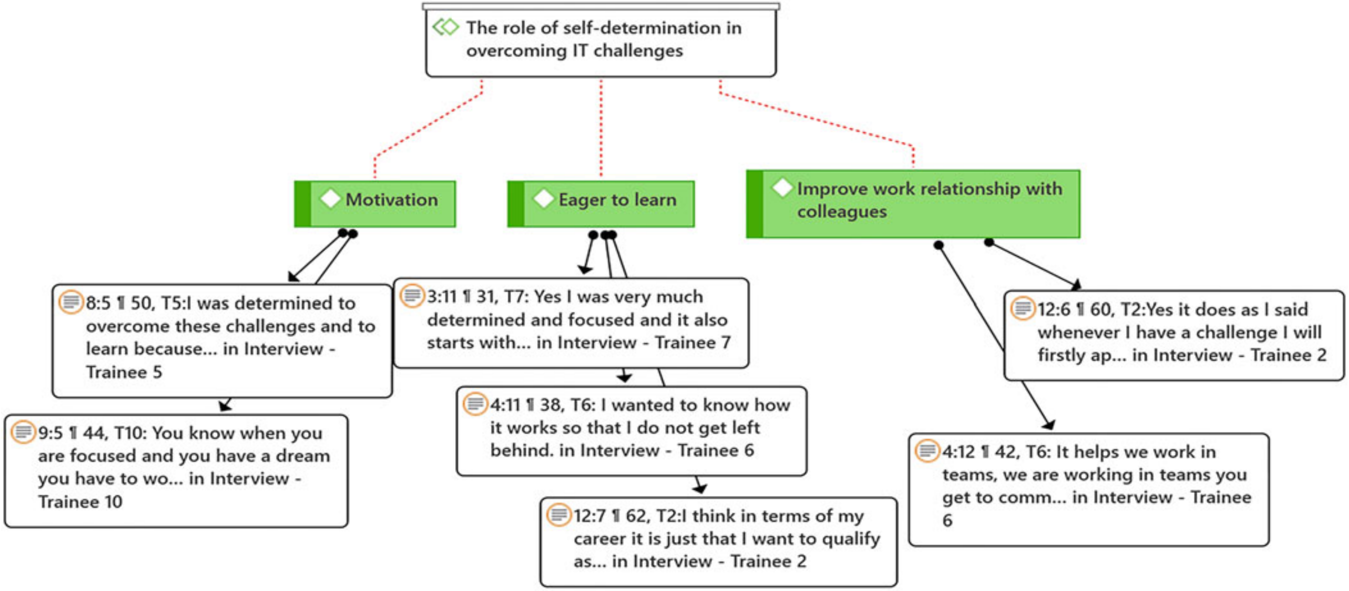

Fig. 1 Role of self-determination in first-year trainee accountants' IT challenges in the workplace

significance of competency in all that trainee accountants do, implying that they should make an effort to learn from their failures.

> T3: The first thing you must say to yourself is to ensure you are competent in everything you do. So, for me, that is self-determination, knowing that I must be competent in whatever I do. And even if I am going to make mistakes, it must be something that I am going to be able to learn from.

With an emphasis on people's feelings of mastery and efficacy in their actions and tasks, this comment highlights the importance of competence needs in SDT (Deci & Ryan, 2000). Competence is defined by Nikou and Economides (2017) as effective behaviour, developing one's own capacities, and a desire to become self-sufficient. The study believes that this is the reason why self-determination enables first-year trainee accountants to be eager to learn and competent in their roles. According to Infante-Moro et al. (2019), competencies are also connected to the capacity to employ a variety of instruments to carry out tasks. This means that first-year accounting trainees who are willing to study and adopt new IT skills that may improve their capabilities can further increase their competence.

5.2 Improved Work Relationships

According to the concept of relatedness, people need to feel a sense of belonging, connection, and positive interactions with others around them. This SDT component emphasizes the value of social interactions and encouraging situations in promoting motivation and completing objectives. Relatedness is a fundamental component of self-determination since it fosters interaction among first-year trainee accountants with other employees, enhancing their working relationships. Participants T6 and T5, for instance, emphasized the value of teamwork and open communication when addressing issues.

> T6Working in teams is beneficial since it allows for easy communication in the event of an issue. When I'm having trouble working with a teammate, I let other co-workers know what's going on, and they offer to help.

> T5: Yes, I frequently consulted an internal auditor colleague of mine.

Both Manager M2 and Trainee Accountant T2 stressed the value of asking your co-workers for help when you're having a hard time. These remarks imply that fostering motivation and attaining goals depend on social support and positive working relationships. T2: Yes, it does; as I said, whenever I have a challenge, I first approach my colleagues.

The conclusion that can be made from the aforementioned data is that self-determination fosters relatedness. This suggests that in order to learn from their peers, first-year accounting trainees required to interact with them. According to Racero et al. (2020), relatedness is a good indicator of trainee accountants' desire to continue working despite IT difficulties. According to Arvanitis (2017), the pressure imposed on aspiring accountants has caused them to develop relatedness in an effort to increase their expertise.

Participant M2 confirmed this:

> M2: I believe it does, yes. As I previously stated, the framework is in place, and colleagues and mentors are available to assist. You will complete your work more slowly than others and fall behind if you remain passive and we forget about you for any reason. We won't be extending your contract.

The interpretation of Participant M2's comment is that the accounting firm has provided first-year trainee accountants with mentors who can assist them with their IT skills challenges. It then becomes the responsibility of the first-year trainees to communicate with them about any aspect they are struggling with. Participant T4 affirmed this view:

> T4: If I understand correctly, self-determination refers to a person's resolve to obtain something or to finish a task. It's similar to promising oneself that you will take this action. Therefore, it will be simpler to work with your colleagues and gain more knowledge from them if you start by telling yourself that you can accomplish it.

These comments from first-year trainee accountants suggest that they found support and motivation through positive relationships with their colleagues. Working in teams provided opportunities for communication, problem-solving, and learning from each other. This aligns with SDT's emphasis on the importance of relatedness in enhancing motivation and promoting personal growth.

Additionally, the remarks made by the participants imply that the sense of relatedness produced by good workplace interactions was crucial in supporting their right to self-determination. Trainee accountants should maintain focus on their objectives and be persistent when overcoming difficulties by having encouraging co-workers and mentors. This emphasizes how the various SDT components interact with one another, as relatedness can support autonomy and competence and vice versa.

The significance of relatedness in SDT has also been addressed by earlier study. For instance, research (Deci & Ryan, 2000; Vansteenkiste et al., 2004) has demonstrated that a sense of connection and belonging can increase motivation and boost well-being. Positive social relationships have also been linked to improved levels of performance, engagement, and job satisfaction at work (Sypniewska et al., 2023; Tran et al., 2018).

Therefore, the findings from this study are consistent with previous research and highlight the importance of fostering positive work relationships and supportive environments in promoting motivation and achieving work-related goals. By fostering a sense of relatedness among first-year trainee accountants, organisations can facilitate the development of IT skills and enhance the overall success of their trainee programmes.

5.3 Motivation

The participant comments underscore the critical importance of motivation in helping first-year trainee accountants overcome their lack of IT abilities. These remarks highlight the significance of having specific objectives, a strong feeling of resolve, a narrow perspective, and self-motivation. Guay (2022) asserts that the SDT portrays motivation as a multifaceted notion, highlighting the shifting characteristics of human needs, motivational traits, and psychological well-being within a social context. Extrinsic and intrinsic motivation are both parts of self-determination. This suggests that motivation fosters a learning environment for first-year trainee accountants.

Participant T11 mentioned that the motivation to complete the training contract and achieve specific goals served as a driving force to learn more and avoid wasting time on unimportant tasks. This comment suggests that having a clear end goal can provide motivation and direction for acquiring IT skills.

> T11: I was driven to complete my training contract because I had a clear idea of what I wanted to accomplish in the end. That inspired me to learn more, never waste time on unimportant things, and learn everything I could.

Similarly, T5 was motivated to overcome IT challenges and learn extensively to ensure a smooth transition into future job opportunities after the training contract. This participant's motivation was derived from the desire to be well-prepared and competent in IT skills, which would enhance employability.

> T5: I was motivated to study and overcome these IT problems because I knew that after my contract ended, I would need to be familiar with all of these IT abilities in order to get employment without difficulty.

The results of this study suggest that because first-year trainee accountants desire to be productive in their next job after completing their training contract at the accounting companies, they are driven to overcome their IT-related obstacles. T10 emphasized the value of having a determined attitude and a strong work ethic to handle the pressure of learning IT skills. According to this statement, resilience issues can be facilitated by a determined mindset and the commitment to achieving predetermined goals.

> T10: When you are focused and have a dream, you must work towards it. So, I was able to sit down and know that I had to work hard, as whatever I set out to do, I wanted to achieve it. So that mindset enabled me to cope with the stress of ensuring I passed at the end of the day.

Participant T3 said that her son gives her motivation, thus she must continue to put in the effort to qualify as a chartered accountant in South Africa. She had to deal with any stress brought on by IT as a result. This suggests that Participant T3's commitment to her family drives her to be self-motivated to get rid of the stress caused by her work in IT. According to Krause et al.'s research from 2019, the SDT fosters a person's motivation to overcome obstacles.

M2 emphasized the impact of looking up to successful seniors and the drive to imitate their accomplishments. As trainee accountants work to match the proficiency and expertise of seasoned professionals, the desire to achieve and perform at a similar level can be a strong motivator.

> M2: They relate well, and their self-determination encourages them because they look at their seniors and see that they are doing great, and they understand some of the things they don't. So, they want to be like them; they want to do things like them, so they are motivated to work hard.

T9 emphasised the importance of self-motivation and inner drive-in pursuing goals. This comment suggests that individuals must be internally motivated to succeed and take personal responsibility for their own progress and development.

> T9: Yes, for me, I think you need to have self-motivation. It has to come from you if you want something; it must first come from within.

The conclusions drawn from the comments of the participants are consistent with the tenets of SDT, which emphasize the significance of intrinsic motivation and self-determination in propelling people toward their objectives (Deci & Ryan, 2000). According to SDT, the remarks made by the participants support the theory that people are more likely to persevere in difficult activities when they feel a feeling of autonomy, competence, and relatedness. Guay (2022) contends that motivation can be used to recognize self-determination. According to Bachman and Stewart (2011), motivation is a key tactic for inspiring trainee accountants to succeed and empowers them to be self-determined in reaching their objectives.

Overall, the comments highlight the pivotal role of motivation, determination, a focused mindset, and self-motivation in overcoming IT skills challenges for trainee accountants. Furthermore, these motivational factors can serve as catalysts for continuous learning, growth, and success in acquiring and applying IT skills within their professional roles.

6 Limitations and Suggestions for Future Research

The study was limited to accounting firms in the Mafikeng area, in the North West Province of South Africa, with the primary participants being accounting firm managers and first-year trainee accountants. Another limitation is the use of a qualitative research approach only. A mixed-methods approach using qualitative and quantitative research strategies could be considered for future studies. In addition, the inclusion of second or third-year trainee accountants as well as accounting firms from other provinces in South Africa may enable the researcher to draw more generalised conclusions about trainee accountants in South Africa.

7 Conclusion

This study found that self-determination plays a crucial role in motivating first-year trainee accountants to deal with IT challenges encountered in the workplace. Trainee accountants' self-determination is driven by various factors, such as the need to achieve their desired goals, meet job requirements, and enhance their competence in IT skills. The trainee accountants were eager to learn any difficult IT skills necessary to carry out their duties. Positive work relationships and social support were essential for promoting motivation and achieving goals. The study suggests that accounting professional bodies and firms have a role to play in enhancing the competence of trainee accountants. This could lead to increased motivation, job satisfaction, and improved work performance among trainee accountants.

The findings of this study provide valuable insights for accounting education, accounting professional bodies, accounting firms, and other stakeholders into the various IT challenges first-year trainee accountants encounter and how self-determination is practised to overcome these challenges.

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Information Technology Governance in Local Government: Audit Committee Responsibilities

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Abstract The study aims to assess the effectiveness of information technology (IT) governance in local government by examining the audit committee's role and capabilities relating to IT governance. This study is prompted by a local government IT infrastructure failing to adequately support service delivery to communities due to poor governance skills and knowledge of audit committees. The risk of mismanagement of resources is therefore increased. The study employs a quantitative research approach and a descriptive research design. A questionnaire survey was used to collect data from the audit committee members, internal auditors, managers and Chief Audit Executives and Council and municipal management. The researcher used descriptive and inferential statistics, Stata/SE version 16 software, descriptive analysis, chi-square test, effect factor analysis and exploratory factor analysis to measure the relationship between two-factor variables. Kaizer criterion was accepted as the extraction method, while the Cronbach alpha coefficient was used to determine the internal consistency of the identified factors. The study reveals that audit committees are ineffective in executing their IT governance activities. Furthermore, there are areas of concern in IT assurance audits. The internal audit function lacks the skills and technical capacity to provide IT assurance services and therefore not add sufficient value to the municipality. The study concludes that there is a significant statistical correlation ($P < 0.001$) between poor IT governance and audit committee skills and expertise. The study recommends that the recruitment of audit committee members should consider their experience in IT governance to ensure that auditors are well-equipped to review IT governance assurance effectively. Also, the importance of IT assurance services by competent, skilled internal auditors was expressed. The study contributes to governance literature by providing empirical evidence on audit committees' IT governance and oversight effectiveness, and also emphasises the need to assess IT engagements by internal auditors. Academic researchers and the National School of Government can use the findings of the study as justification for on minimum required skills and capacity building for audit committee members.

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1 Introduction

Over the years IT has globally influenced how organisations conduct their businesses and municipalities are not exempted from such impacts (Christiansen, 2013). As a result of the fundamental challenges that the world faces, all aspects of modern life are influenced by IT in one way or another (Lloyd, 2004). The development and evolution of IT has influenced how data and information are processed, which then impacts the decision-making processes within corporate spaces (Khemakhem & Fontaine, 2019).

The advent of IT has come with various advantages and disadvantages (Joseph, 2015), which the South African government has also been subjected to. Such advantages include improved productivity, decreased expenses (Grant & Chau, 2005; Mostert & Mutula, 2010) accelerating revenue flows (Tarek et al., 2017) improved information quality (Barnes & Vidgen, 2006) improved promotion of good governance (Bertot et al., 2010) ability to stamp out corrupt and fraudulent activities within organisations (Bertot et al., 2010; Sabani et al., 2019) and enabling innovation (Ravichandran et al., 2017). Kim et al. (2017) and Al-Salmi and Hasnan (2015) believe that the adoption of IT embedded with such advantages will significantly enhance the operational capacity of an organisation.

However, the lack or non-adoption of governance principles might contribute to the perception that IT is adding little or no organisational value despite substantial investments being made (Marnewick & Labuschagne, 2011). Riggins and Wamba (2015); Ndou (2004) highlights that there are significant challenges concerning the adoption and implementation of IT in government, accentuating the lack of skills in the public sector as a significant obstacle. Bakunzibake et al. (2019) emphasise change management as a key challenge to the successful implementation of IT. This constantly changing environment calls for effective governance, risk management and controls, such as cyber security management. Inuwa et al. (2019) believe that ungoverned IT can provide opportunities for corrupt bureaucrats to misuse it for personal gains. Effective governance not only relates to policies but also includes the culture and tone at the top of the governing body and the effectiveness of governance structures (such as internal auditing) in assisting with the assessment of IT related processes. However, with the increased adoption of IT in municipalities, there is limited research on the effectiveness of audit committee in IT governance. Through the lenses of agency theory, the study provides empirical evidence on the effectiveness of audit committees in IT governance and highlights the importance of building the minimum required skills and capacity for audit committee members in IT governance.

The paper begins by outlining the literature review and theory for the study, discussing IT as a concept, IT governance and the impact of effective IT governance. The study then discusses IT risk management and value delivery. Next, the theory on audit committee is discussed. Followed by examining the effectiveness of the audit committee pertaining to IT. The paper then describes the research design and approach, after which the research findings are presented. Finally, the paper provides concluding remarks and identifies areas for future research.

2 Literature Review and Agency Theory

As a result of the competitive advantage derived from the use of technologies, organisations have since adopted IT as key function of the business. Organisational reliance on IT resulted in challenges, to an extent that corporate governance cannot be addressed without IT governance being considered (Van Grembergen & De Haes, 2007). IT governance is cited as a strategic issue that requires commitment at a strategic level (Mohamed, 2012). Mikalef et al. (2018) support this, arguing that IT governance has been elevated to a primary concern for senior IT officials and business management. It is for these reasons that IT governance is high on the agenda of many organisations (Ali & Green, 2012) and it has similarly received much attention in academic spaces. This is evident in the variety of scholarly definitions of IT governance that exists in the literature the lack of consensus is apparent (Lee & Lee, 2009).

A variety of scholarly definitions of IT governance available, however according to Webb et al. (2006) that the various definitions do not all reflect crucial elements of the IT governance framework, possibly indicating that authors develop definitions that support their focus at the time of their research. Carr and Hayes (2015) and Alves et al. (2013) say although there is no commonly accepted definition of IT governance, commonly agreed upon definition of IT governance would be very useful and serve to develop and refine IT governance frameworks. These frameworks, as depicted in Fig. 1, would outline the processes and structures that have been put in place that enable IT and business to meet their objectives in terms of risk, resources and performance management while aligning with the business' strategic objectives to enable the business to derive value from its IT investments. The effective functioning of the IT governance framework is reliant on the IT governance structures in place, as depicted in the Fig. 1 below. Audit committee is one of the key pillars of governance in any organisation.

2.1 Governance and Audit Committees

Governance structures and processes are crucial for fostering transparency, accountability, and effective decision-making within organizations (Ananny & Crawford, 2018). Within governance framework, the audit committee holds a key role as part of governance, overseeing and providing guidance on various aspects of organizational operations, including IT governance. IT governance encompasses the framework

Fig. 1 IT Governance Framework and Model. Source: IT Governance Framework and Model, 2020

and processes through which an organization manages and controls its IT systems and operations (Weill & Ross, 2004). The audit committee's responsibility lies in ensuring the presence of appropriate controls and processes that align IT strategically with business needs and objectives, deliver value through IT investments, identify, and manage IT risks effectively, and promote efficient resource and performance management (Iliescu, 2010).

To effectively fulfil their responsibilities, the audit committee must possess the necessary qualifications and skills in IT governance, as emphasized by Chen et al. (2022a, 2022b). This expertise enables audit committee members to comprehend and evaluate IT-related risks and controls, as highlighted by Lankton et al. (2021). The existing literature mainly discuss the importance of expertise and skills in audit committees, but there is limited studies which address IT governance skills. Several studies, including those by Ojeka et al. (2021) and Hadden and Hermanson (2003), emphasize the importance of including IT risk and control discussions in the audit committee agendas. Omer et al. (2020) further assert that the audit committee must have a solid understanding of IT risk management and controls. Additionally, Brand (2016) emphasizes the significance of conducting independent IT audits at regular intervals, separate from financial audits. This separation allows the internal audit function to provide objective and independent evaluations of IT controls and processes, serving as a source of assurance for the audit committee. The capacity and effectiveness of the internal audit function are crucial considerations for the audit committee in fulfilling its responsibilities.

The audit committee plays an advisory role in evaluating the adequacy of disaster recovery and continuity plans, ensuring the organization has robust measures in place to mitigate IT-related disruptions and protect critical systems and data (Contessotto & Moroney, 2014). Additionally, the audit committee actively supports management in addressing IT risks by regularly testing and evaluating cyber security threats, recovery plans, systems, and processes through the internal audit function (Zanzig & Francia III, 2022). However, while having a well-resourced internal audit function is important, it may not be sufficient for providing valuable if the audit plans are not reviewed and approved by the audit committee. (Herdan, 2008). To address this, the audit committee should review the internal audit function's plans to ensure adequate coverage of IT governance, risks, and controls, as highlighted by Abbott et al. (2010). This assessment helps identify any gaps or areas that require additional attention in the governance of IT within the organization. However, there is a gap in the literature regarding how effective the audit committee is in executing their IT governance role, especially in the South African local municipality context.

2.2 Agency Theory & the Role of Audit Committee in Enhancing IT Governance

The audit committee is a board subcommittee responsible for matters relating to financial reporting and audits (Oji & Ofoegbu, 2017; Spira, 2003). Agency theory, which postulates that conflicts of interest between management and shareholders can arise due to divergent objectives and information asymmetry (McColgan, 2001), can be a useful lens to study IT governance and the role of audit committees in organisations. The literature review in this study highlights the importance of IT governance in maximising the value of IT investments, managing IT risks, and ensuring the overall effectiveness of an organisation's IT systems. In the context of agency theory, these issues can be viewed as potential conflicts between managers, who may seek to maximise their own utility and shareholders, who desire maximum value from their investments.

The role of the audit committee in IT governance can be understood through the lens of agency theory as a mechanism to align the interests of management and shareholders by providing oversight and guidance on IT risk management, internal controls, and IT investment decisions (DeZoort et al., 2002; Moloi, 2014; Oji & Ofoegbu, 2017). The audit committee's expertise in IT and cybersecurity (Ashraf et al., 2020; Legodi, 2021) helps to mitigate the information asymmetry that can exist between management and shareholders with respect to IT-related decisions, thereby reducing the potential for conflicts of interest.

The literature review also highlights the need for a more integrated approach to IT governance, risk management and control, in which the audit committee plays a central role. This aligns with the agency theory perspective that calls for monitoring mechanisms to mitigate conflicts of interest and ensure that management actions are consistent with shareholder interests (Jensen & Meckling, 1976; Fama & Jensen, 1983; McColgan, 2001). By overseeing IT risks and controls, as well as promoting good IT governance practices, the audit committee can help to ensure that management's actions align with the strategic objectives of the organisation, which ultimately benefits shareholders.

Furthermore, the literature review emphasises the importance of IT audit specialists and the use of computer-assisted audit techniques (CAATs) in enhancing the effectiveness of internal audit processes (Janvrin et al., 2008; Asniarti & Muda, 2019). In the context of agency theory, these tools and specialists can be seen as additional mechanisms to reduce information asymmetry and provide greater assurance to shareholders that management is effectively managing IT risks and controls.

The agency theory provides a useful framework for understanding the role of the audit committee in IT governance and the mechanisms through which it can help to align management and shareholder interests. By providing oversight, guidance and expertise in IT-related matters, the audit committee serves as a crucial monitoring mechanism to mitigate potential conflicts of interest and ensure the effective management of IT resources and risks within the organisation.

An effective audit committee needs competent and qualified members with the authority and resources to protect stakeholder interests by ensuring reliable financial reporting, internal controls and risk management through its diligent oversight efforts (Moloi, 2014; DeZoort et al., 2002). According to Roussy and Rodrigue (2018) and Moorthy et al. (2011), the audit committee is ultimately responsible for implementing governance structures to evaluate the effectiveness of an organisation's internal control systems, identify errors and inefficiencies and design system controls that prevent defects. However, the role of the audit committee has evolved over the years since the emergence of IT. As a result, IT expertise has become an integral component of the audit committee's skill set that is essential to its effective advisory and oversight role.

Ashraf et al. (2020) examined whether IT expertise of audit committees impact the reliability and timeliness of financial reporting through the difference-in-differences analysis. The study found that audit committee IT expertise resulted in a reduction in the likelihood of material restatement and a reduction in the likelihood of IT-related material weaknesses. The findings supported their assertion that the quality of financial reporting is significantly improved by the presence of an IT expert in the audit committee.

Additionally, audit committees IT skills must include cyber security insight (Legodi, 2021). Ojeka et al. (2017) shared similar sentiments rising from their study that assessed whether a relationship exists between cyber security and audit committee effectiveness using audit committee independence, technological expertise, and financial expertise characteristics as independent variables. The variable used to measure the dependent variable is cyber security compliance. 13 banks listed on the Nigerian stock exchange were selected. The empirical analysis was carried out using product moment correlation and ordinary least square regression analysis methods. The results showed that audit committee characteristics measured by independence, financial expertise and technological expertise all have a nonsignificant negative relationship to cyber security in the Nigerian banking sector. The study recommended that the composition of the audit committee in Nigeria be worked on to deliberately incorporate needed technological and financial experts who can ask probing questions and offer their wealth of experience in safeguarding the shareholder's interest. The severe impacts of cybercrime and the growth of cyber threats have resulted in a need for organisations' boards of directors to be involved in IT governance (Corradini, 2020); such involvement by the board may better equip the organisation to deal effectively with the challenges that come with IT. However, little is known about the audit committee's role in IT governance (Lankton et al., 2021).

In organisations, a documented audit committee charter defines the purpose, structure, internal controls and roles and responsibilities of audit committee members (Deloitte, 2017). Lankton et al. (2021) investigated the influence of security breaches and board-level technology committees on disclosing IT general controls roles in the audit committee charter using efficiency and institutional theories using a sample of 189 firms. The finding pointed out that those organisations with an IT committee that experienced a data breach are more likely to disclose IT governance roles in the audit committee charter. The findings suggest that firms experiencing a data breach realise their vulnerability and because they already have oversight at the board level, it is more natural for them to increase oversight by assigning IT governance roles to the audit committee.

The audit committee should scrutinise IT-related risks (Ashraf et al., 2020). Turel et al. (2017); Ramamoorti and Weidenmier (2004) point out that the role of the audit committee and internal auditors nowadays lies in scrutinising IT solutions brought into the business environment (Abu-Musa, 2008). An audit committee should be a team of experts with sufficient skills, abilities and knowledge to recommend the most effective systems (Chen & Komal, 2018; Bierstaker et al., 2001). In other words, most authors suggest that the audit committee should now move from the traditional role of only overseeing accounting reports and principles to include overseeing the IT solutions of an organisation (CFA Institute, 2021; Moorthy et al., 2011; Jackson, 2004).

According to Moorthy et al. (2011), the change of role for the audit committee has been a challenge. Huff et al. (2006) conducted a study to determine if the audit committee gives attention to their new roles related to IT governance. Their study interviewed board chairs and members of 17 medium-to-large corporations, most with global operations. The findings suggested that the audit committee is not allocating adequate attention to its role in IT governance. The study further suggests ways in which the audit committee can adopt and adapt to the newly transferred oversight role in IT governance, one of them being to include IT controls and risk as agenda items for discussion in board meetings. Legodi (2021) concurs to the recommendation, stating that IT should be a standing agenda item in the audit committee meetings (Legodi, 2021). This recommendation is in line with the guidelines of King IV, that the audit committee should discuss the IT related risks and controls (IoD, 2010).

According to Moorthy et al. (2011), the audit committee is ultimately responsible for implementing governance structures to evaluate the effectiveness of an organisation's internal control systems, identify errors and inefficiencies and design system controls that prevent defects. This applies even with regard to IT control environments. With the increasing adoption of information systems and technology, independent IT audits should be carried out at regular intervals and given special attention (Byrnes et al., 2018). Internal audit reviews are regarded as audit committee comfort providers (Susanto, 2020). IT audits are regarded as an integral part of internal audits. Thus, the audit committee should discuss these in their meetings and be in a position to support the audit department in being able to conduct the internal audit reviews relating to the IT environment of the municipality. This can be achieved by ensuring that the internal audit department of the municipality has and uses efficient IT audit resources to enable them to review the municipality's IT related controls effectively and efficiently (Weidenmier & Ramamoorti, 2006). Resources include the use of IT audit specialists where necessary. Janvrin et al. (2008) found that the use of IT specialists is common, even among auditors who are assigned to examine complex IT systems. According to Asniarti and Muda (2019), operational internal audit reviews of IT are improving due to better CAAT use. This may be the root cause of why studies have found that the IT audit may not be conducted to the required level and depth (Hadden et al., 2003).

Muchenje (2013) says that there are advantages to using IT; however, there are inherent business risks that must be managed effectively. According to Tarek et al. (2017), ensuring that the right people oversee IT risks at an organisation is essential and the audit committee is rightfully charged with this oversight role by the charter. The audit committee is responsible for setting the tone for the risk culture in the organisation (Cassidy et al., 2001). Seale (2017) studied factors influencing the decision to adopt an IT risk management framework at universities in South Africa. The study used a deductive approach and found that the key staff members responsible for ratifying the adopted enterprise risk management framework were audit committees, risk committees and senior IT management committees, amongst others.

Furthermore, audit committees should oversee and advise on hardware and software security. Software security should be prioritised in an organisation (Reeder et al., 2017; Mead et al., 2008). Software security measures such as encryption can be used to control access to files, as can firewalls that help give access only to authorised users. Physical security should also be improved, such as by locking doors and restricting computer room access (Alqatamin, 2018). Such physical and software risks and controls, therefore, need to be addressed by the audit committee in fulfilling its fiduciary role (Cohen et al., 2017; Hadden, 2002). The other responsibility of the audit committee is to provide confidence to customers involved in e-commerce transactions with the organisation. Moreover, it is an internal control measure to provide reliable financial statements (Bananuka et al., 2019). In addition, there is enterprise risk management, which the audit committee must deal with in real-time (Ojeka et al., 2017). According to Tarek et al. (2017), ensuring that the right people oversee IT risks at an organisation is always essential.

Therefore, based on the literature review, it is critical that the audit committee has IT knowledge and can provide adequate oversight. Limited studies have been conducted on the effectiveness of audit committee in providing IT governance oversight, especially in the South African local municipality context. Based on the above discussion, the study aims to provide empirical evidence.

on the effectiveness of audit committees in IT governance and highlights the importance of building the minimum required skills and capacity for audit committee members in IT governance.

3 Research Methodology

The data of the audit committee activities in enhancing IT governance were collected by means of a Likert scale survey questionnaire at the Sekhukhune District municipality in the Limpopo province of South Africa. The municipality consists of four local municipalities, namely Fetakgomo/Tubatse, Ephraim Mogale, Elias Motsoaledi and Makhuduthamaga. The questionnaires were distributed to all local municipalities and primarily completed by the audit committee members, internal audit staff, municipal management officials and the operation staff members who are exposed to the work of the audit committees. The largest group of respondents (74.4%) had more than 5 years of working experience in the similar position while 17% consisted of those with at least 3 years' experience. This indicates that the responses come from knowledgeable and experienced individuals, making them reliable. Furthermore, 44.7% of the respondents have undergraduate qualifications (up to NQF level 7), while 34% possess postgraduate qualifications at NQF level 8 and 21.3% of the respondents hold master's degrees. Effectively, most respondents have at least the minimum required qualifications for their respective positions. This ensured that the data obtained were reliable to address the research problem and to achieve the research objectives. The target population of the study is displayed in Table 1 below.

The researcher is knowledgeable about the audit committee activities and their working relationships with other stakeholders; hence, the purposive sampling of stakeholders was used. Participants were drawn from all the municipalities and consisted of the members of the audit committees, the Chief Financial Officers, Accounting Officers, Chief Audit Executives, internal auditors, and the Heads of Departments/divisions.

The study applied positivist paradigm and quantitative methodology. Quantitative research is predicated on the assumption that there is an objective to study, a research problem to examine and an obligation to manage and measure the data collected (Babbie, 2020). Data were analysed through descriptive and inferential

Table 1 Target population and sample size in selected municipalities

	Municipality					
Participant Groupings	A	B	C	D	E	Total
Audit committee	5	5	5	5	5	25
Internal auditors/managers	2	2	2	2	2	10
Municipal council & management	17	18	8	17	4	64
Total						99

statistics employed by the researcher. Stata/SE version 16 software was used to analyse the statistical data obtained through the survey questionnaires.

Descriptive analysis was produced using frequency tables. The chi-square test was used for inferential statistics to measure the significant relationship between two factor variables. The effect factor analysis and correlations were measured to understand how the different underlying factors influence the variance amongst the variables. Exploratory factor analysis was used as the extraction method with varimax rotation conducted to determine the dimensionality of each of the subsections; factors with Eigen values above 1 (Kaizer criterion) were accepted. The Cronbach alpha coefficient was used to determine the internal consistency (reliability) of each of the identified factors using the agreed thresholds stated in the literature as 0.5 (acceptable); 0.6 (satisfactory for exploratory research) and 0.7 (most used instrument) (George & Mallery, 2003).

4 Findings

The literature section of this study outlined the existing literature regarding the role of the audit committee in IT governance. The literature was used to inform the development of the questionnaire used to collect the data on the audit committee activities in enhancing IT governance. The results of the response analysis are presented in Fig. 2 and further discussed in this section.

Figure 2 illustrates that a significant majority of respondents (65.9%) agreed or strongly agreed that at least one member of the audit committee must have appropriate qualifications and skills in IT and governance, A larger majority (83.3%) agreed that audit committee meeting agendas include the IT risk and controls as discussion points, 20.4% were neutral, 64.6% agreed that independent IT audits are carried out at regular intervals, 71.5% agreed with the municipality on the appropriateness of its disaster recovery and continuity plans, 51% disagreed with the security audit committee's substantive reports on the organisation's top cyber-threat risk management priorities and 38.8% argued that internal audit uses efficient IT audit tools to enable them to effectively review the municipality's IT related controls. A solid majority of the respondents (68.7%) agreed either way.

The main findings form the results illustrate that participants are concerned about the audit committee's effectiveness in enhancing IT governance where it concerns cyber security and in ensuring that the internal audit function is adequately resourced and skilled to assist in proving assurance regarding the IT risks and control environment of the municipalities. As outlined in the literature review, Brand (2016) and Abbott et al. (2010), it is important for audit committees to ensure that the internal audit function is adequately resourced to address IT governance issues.

EFA was used to summarise the variables included on the questionnaire and develop factors and make meaningful factors for further analysis. Table 2 presents the factor loadings, and the discussion then follows:

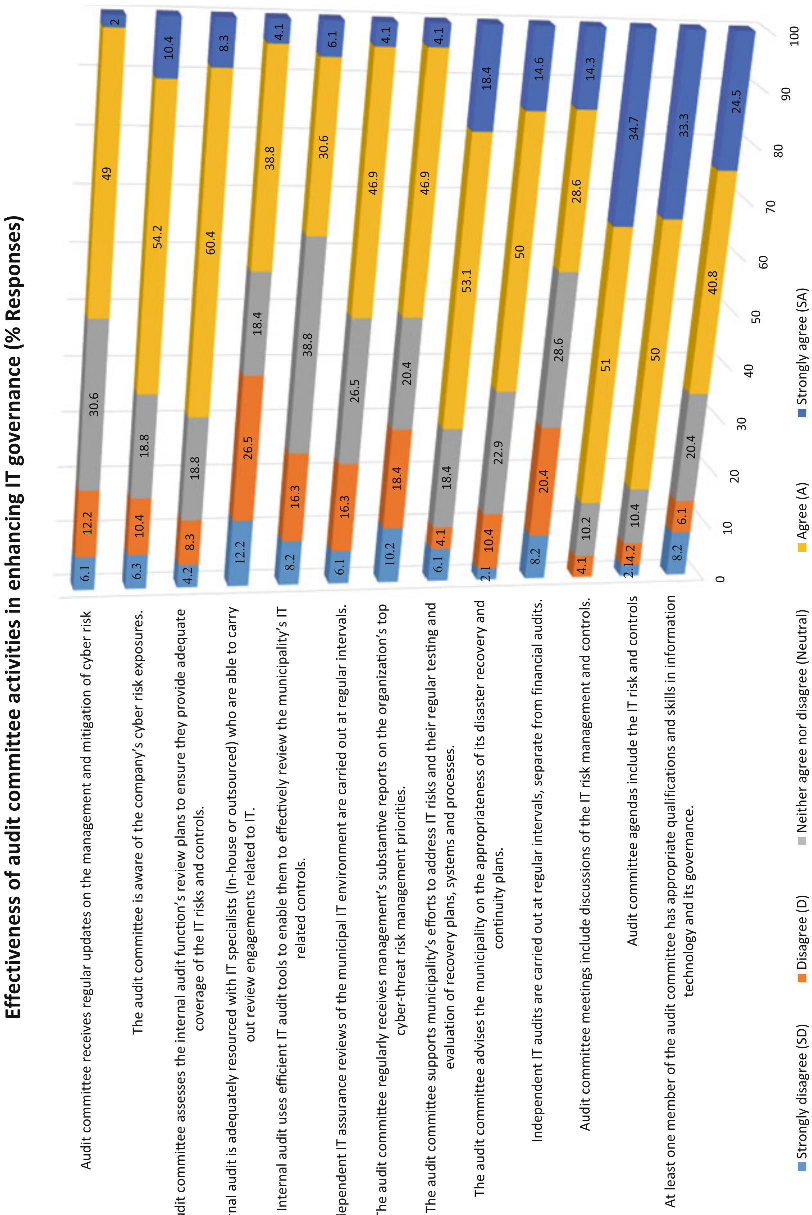

Fig. 2 Descriptive statistical presentation of the responses. Source: Researcher's own illustration

Table 2 Exploratory factor analysis for IT and audit committee

Factor	KMO & Bartlett's test (sig. value)	% Variance explained	Factor loadings		Cronbach's alpha
IT and Audit Committee	0.858 P < 0.001	77.8%	Factor 1	Factor 2	0.9291
At least one member of the audit committee has appropriate qualifications and skills in IT and its governance.				0.7572	
Audit committee agendas include the IT risk and controls				0.7784	
Audit committee meetings include discussions of the IT risk management and controls.				0.8014	
Independent IT audits are carried out at regular intervals, separate from financial audits.			0.4782		
The audit committee advises the municipality on the appropriateness of its disaster recovery and continuity plans.				0.7219	
The audit committee supports municipality's efforts to address IT risks and their regular testing and evaluation of recovery plans, systems, and processes.				0.7014	
The audit committee regularly receives management's substantive reports on the organisation's top cyber-threat risk management priorities.			0.6391		
Independent IT assurance reviews of the municipal IT environment are carried out at regular intervals.			0.6701		
Internal audit uses efficient IT audit tools to enable them to effectively review the municipality's IT related controls.			0.6785		
Internal audit is adequately resourced with IT specialists (In-house or outsourced) who are able to carry out review engagements related to IT.			0.6080		
Audit committee assesses the internal audit function's review plans to ensure they provide adequate coverage of the IT risks and controls.			0.7135		
The audit committee is aware of the company's cyber risk exposures.			0.6080		
Audit committee receives regular updates on the management and mitigation of cyber risk			0.8521		

Source: Researcher's own illustration

Table 2 shows that the audit committee's influence on the original variables for IT and audit committee is shown to be significant, with two factors accounting for 77.8% of the variance. The first factor is the direct correlation between independent IT audits, management's top cyber-threat risk management priorities, internal audit tools and internal audit resourced with IT specialists. The second factor is a positive correlation between variables, with at least one member of the audit committee having appropriate qualifications and skills in IT and its governance, activities including IT risk and controls, meetings, discussions, disaster recovery and continuity plans and supports municipality's efforts to address IT risks. This factor represents the audit committee's IT governance skills, experience, and expertise.

Table 3 Descriptive statistics for factor variables

Factors	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
Audit committee IT Governance oversight responsibility	1.00	4.63	3.2500	0.80309	−1.094	1.345
Audit committee IT Governance skills, experience and expertise.	1.60	5.00	3.8936	0.78779	−1.015	1.233

Source: Researcher's own tabulation

Table 4 The relationship between factor variables correlations

Factor	Audit committee IT governance oversight responsibility.	Audit committee IT governance skills, experience, and expertise
Audit committee IT governance oversight responsibility.	1	
Audit committee IT governance skills, experience, and expertise	0.685**	1

Correlation is significant at the 0.01 level (2-tailed). **
Source: Researcher's own tabulation

Table 3 shows that each factor variable had instances where either all the respondents or none of the respondents agreed with the individual variables that were encompassed by the questionnaire's statements. Instances where not a single participant agreed with the statement should raise red flags because this may be an indication of ineffective performance on the part of the audit committee. The relationship between factor variables was determined using a Pearson correlation coefficient, which indicates the direction and strength of the relationships between the factors (Table 4).

The table reveals a strong positive relationship between audit committee IT governance skills, experience and expertise and oversight responsibility. This suggests that more audit committees are more likely to effectively execute their roles and activities in a way that enhances IT governance in the municipalities. These findings are consistent with literature as outlined by Chen et al. (2022a, 2022b) in saying that IT expertise enhances the audit committee's monitoring ability and oversight of cybersecurity risks.

5 Conclusion and Recommendations

The study found that the audit committee is effectiveness is limited as a result of inadequate IT audits and assurance reviews, under-resourced IT audit department and inadequate auditing tools. Furthermore, statistical analysis revealed a relationship between audit skills and expertise, audit committee interpersonal skills and how the audit committee execute their oversight role in IT governance. These results are consistent with the findings of Ashraf et al. (2020) and Chen et al. (2022a, 2022b), who found that financial and risk monitoring responsibilities are enhanced by the presence of IT governance skills, experience, and expertise. The findings validate the Agency theory to some extent. They suggest that deficiencies in IT audits, under-resourced IT audit departments, inadequate auditing tools, and the importance of audit skills and expertise all influence the effectiveness of audit committees in IT governance. These findings highlight the significance of appropriate monitoring and control mechanisms in mitigating agency problems and aligning the interests of principals and agents within organizations.

In order for audit committees to effectively fulfil their role and responsibilities in IT governance, it is crucial for them to continuously enhance their skills and knowledge in IT risks, particularly cyber threats. Additionally, it is essential for these committees to ensure the efficient functioning of the internal audit function by providing adequate resources, both in terms of technology and human capital, to conduct IT assurance reviews. By doing so, audit committees can effectively contribute to the overall IT governance organizations.

6 Recommendations for Future Research

Audit committee roles could be studied further in South Africa to expand their role beyond traditional internal control, financial reporting, and IT areas. Qualitative research could be used to gain an in-depth understanding of the impact of audit committee activities on local government governance. This could help to identify the strengths and weaknesses of audit committees, as well as improve audit outcomes despite the introduction of Operation Clean Audit Outcomes in 2014. Based on the findings of the study, a study can be conducted to assess the effectiveness of internal audit functions in conduct IT audit assurance, with specific focus in local government.

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Identifying AI Corporate Governance Principles That Should Be Prevalent in a Governance Framework for Business

Coovadia Husain, Marx Benjamin, and Ilse Botha

Abstract Artificial Intelligence (AI) is widely used in business to increase productivity and harness the benefits that could emerge from is use. However, with the increased use of AI in business there are number of risks that are brought to the fore. The task would be to develop sound AI corporate governance principles to reduce the AI risk. To the extent of literature search research in AI and corporate governance does not position AI principles that need to be included in any AI corporate governance framework from a South African perspective. Given the importance of AI corporate governance AI governance principles will be identified to be included in an AI governance framework. Through a documentary analysis of literature this study identifies eight broad themes with various corporate governance principles that need to be prevalent in an AI governance framework for South Africa. These eight broad themes include (1) Principle concerns, (2) Procedural governance mechanisms, (3) Overarching ethical concerns, (4) Reasons for creating AI governance frameworks, (5) AI applications and technology layer, (6) AI law regulation, (7) AI Society, (8) AI regulation and process layer. It is essential that business start considering these themes when developing an AI governance framework that will be implemented in business.

Keywords AI · AI Governance · Machine learning · Natural language processing · Corporate Governance

1 Introduction

Artificial intelligence (AI) is a broad field that encompasses computer science, psychology, philosophy, linguistics, and many other areas of study (Deloitte, 2018). "AI involves the analysis of big data to allow a machine to reason, learn and problem-solve" (Haenlein & Kaplan, 2019, p. 4). These faculties of

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problem-solving have enticed businesses to harness the vast possibilities of AI (Mittelstadt et al., 2016, p. 1). Investments in AI to better processes are currently undertaken by many businesses globally (Crawford et al., 2019). According to Deloitte (2018), 37% of businesses using AI have invested more than US$five million into AI technologies. Deloitte (2018) adds that businesses that have made investments in AI are now seeing the benefits. They further stated that these companies have indicated that AI will enhance their operations and more importantly influence their decision making (Edelman, 2019). However, with the increased use of AI in business there are a number of risks that are brought to the fore. According to Boddington (2017), the task would be to develop sound AI corporate governance principles to reduce the AI risk.

2 Literature Review

Corporate governance is the alignment of all material stakeholders, including society, economics, individuals, and community to create value for all in a responsible manner (Institute of Directors South Africa, 2022). This view of corporate governance implies that wealth should be created for all stakeholders, but not to the detriment of any other stakeholder in the process. Boddington (2017) concurs with this understanding of corporate governance, in which it is stated that corporate governance essentially involves balancing the interests of a company's many stakeholders. Corporate governance is further described as the framework of rules, practices, and processes used to direct and manage a company (Haes & Grembergen, 2015). This view establishes the notion that corporate governance relies on the creation of certain processes and frameworks to guide a business in making the correct decisions for all material stakeholders. King IV™ defines corporate governance as "the exercise of ethical and effective leadership by the governing body towards the achievement of the governance outcomes of ethical culture, good performance, effective control, and legitimacy" (Institute of Directors South Africa, 2022, p. 15). This means that corporate governance is creating ethical value for all material stakeholders. It states that the "governing body should govern technology and information in a way that supports the organization setting and achieving its strategic objectives" (Institute of Directors South Africa, 2022, p. 18). This means that those that are charged with governance of an entity should create technological governance processes that provide direction to the entity, which could include aspects such as risk management, performance management, proactive monitoring of the technology, and ethical use of technology.

In addition to the above, AI corporate governance is defined as the process of defining policies and establishing accountability to guide the creation and deployment of AI systems in an organization (Mäntymäki et al., 2022). When done correctly, AI corporate governance empowers organizations to operate with agility and complete trust, rather than slowing them down. Moreover, the definition of AI corporate governance is noted to be the development of rules, practices, and processes used to ensure that the organization's AI technology sustains and extends the organization's strategies and objectives (Abraham et al., 2019). Therefore, AI corporate governance can be defined as creating processes, rules, and practices for an entity that facilitates wealth creation for all stakeholders in an ethical manner.

However, current research by Butcher and Beridze (2019) and Schneider et al. (2020) in AI and corporate governance does not position AI principles that need to be included in any AI corporate governance framework from a South African perspective. Scholars including Boddington (2017) and Crawford et al. (2019) have outlined that each nation needs to develop its own set of AI ethical governance principles for AI and ethics. This is also echoed by the European Commission's High-Level Expert Group, the AI4People and the Institute of Electrical and Electronics Engineers (IEEE). Crawford et al. (2019) emphasise that most AI policies and statements are generated by the Global North, whereas the Global South is largely absent. Given the importance of AI corporate governance it would be essential that the core AI governance principles be identified that should be prevalent in an AI governance framework from a South African perspective. This creates an opportunity for the Global South, and more specifically, for South Africa, to determine which governance requirements are necessary for businesses to adopt, and in the process, determine the AI governance principles to create a conducive AI environment.

3 Objective

To bridge the gap between AI's potential and risks, stakeholders are asking for increased guidance on how to govern AI and manage the implications and risk of unintended outcomes (KPMG, 2021). Stakeholders realize that an AI governance framework can provide organizations with a much-needed mechanism to be proactive in governing, managing, and instilling trust in their technologies (KPMG, 2021). However, current research in AI and corporate governance does not position core AI principles that need to be included in any AI corporate governance framework form a South African perspective. The objective of this paper is to identify through literature the core AI principles that would need to prevalent in an AI governance framework for South African business.

4 Methods and Methodology

The method of this study is a documentary analysis. This method involves the systematic review or assessment of documents. Similarly, to other analytical methods in qualitative research, document analysis requires data to be examined and interpreted to draw meaning and create knowledge (Corbin & Strauss, 2008). Document analysis involves scanning, reading, and interpretation of documents.

This iterative process of scanning, reading, and interpretation results in a thematic analysis. Thematic analysis results in pattern recognition from the data (Fereday & Muir-Cochrane, 2006).

In this study, documentary analysis was used to review literature and identify core AI principles that need to be prevalent in an AI governance framework. The documentary analysis included peer-reviewed journals from the University of Johannesburg (UJ) databases, Google Scholar searches, publicly available records, legislation, white papers, reporting standards, and MIT open lab records. A documentary analysis of literature was undertaken to explain the AI governance processes and establish which should be prevalent in a Governance Framework for business.

5 Results

5.1 Core Principles for Corporate Governance Frameworks

Through the documentary analysis of literature five AI corporate governance themes were identified. These included principal concerns, procedural and structural mechanisms, overachieving ethical concerns, reasons for creating AI frameworks and four layers to create an intergrade AI governance framework. Each of these themes consisted of various principles. Each of these will be explored further to establish AI Governance Principles that should be prevalent in a corporate governance framework for business (Fig. 1).

5.2 Principles Concerns

There are many ethical principles that are brought to the fore when reviewing current literature. This is evident from the work undertaken by Jobin et al. (2019) in their meta-analysis of AI ethical principles. They identified key overlap of principles in various AI ethical documents, including principles such as transparency, justice, and non-maleficence. This was further echoed in a study by Fjeld et al. (2020), in which they refer to the principles of fairness and non-discrimination. These principles, noted in literature, were developed over a period of time, based on current needs and requirements (Fjeld et al., 2020). However, developing governance around these principles is not a straightforward process, but rather one that requires rigorous discussion and debates, as these principles form the backbone of good governance in AI. They allow complex constructs to be narrowed down into a few central themes (Hickok, 2021). Moreover, principles developed allow commitment to a wide range of shared values and can therefore result in influencing institutional decision-making processes (Whittlestone et al., 2019). In addition, they can address public concerns by clarifying the commitment of a business to good governance of AI (Whittlestone et al., 2019). Moreover, these principles created also allow and provide for an

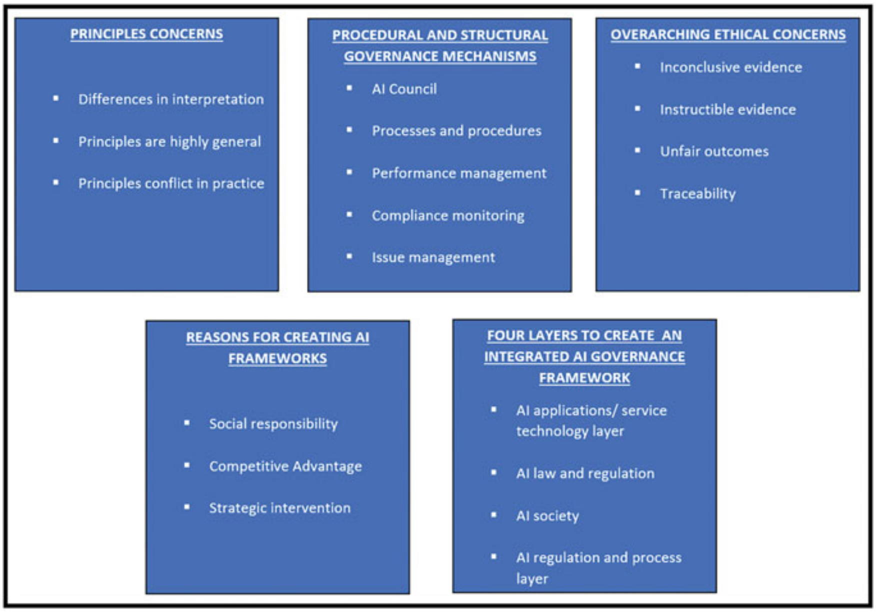

Fig. 1 AI coporate governance themes and its assoicated principles. Source: Authors deduction

informal basis of holding individuals accountable (Morley et al., 2021). The development and convergence of these principles is a key process in creating an AI environment with strong governance (Hickok, 2021).

However, Whittlestone et al. (2019) and Dancy (2004) argue that these core principles noted in the literature are not sufficient to address AI governance. This is due to the number of limitations that the principles bring to the fore that would need to be addressed (Whittlestone et al., 2019). These limitations include that different groups may interpret principles differently, that the principles are too general, and that principles conflict with that which takes place in real life. Whittlestone et al. (2019) and Dancy (2004) argue that no weight should be given to principles, while others (Whittlestone et al., 2019) hold that principles should be considered in conjunction with other facts that are brought to the fore. No matter the views of the scholars, they all agree that, if these principles are used, the limitations that come to the fore need to be addressed (Whittlestone et al., 2019). The discussion will now take a closer look at three limitations noted.

5.2.1 Differences in Interpretation

The terms used in AI governance are complex and can be ambiguous by their very nature (Whittlestone et al., 2019). As Clouser and Gert (1990) noted, this leads to various interpretations of the definitions of the words provided. In addition, principles do not take into consideration the legitimate differences in values across various cultures and regions. For example, in bioethics, the term "justice' is not defined and thus this leaves it to the user, across regions and cultures, to determine what would be just and what would constitute unjust behaviour (Clouser & Gert, 1990).

Within the case of AI governance, this is no different. While all might agree to a certain principle in AI, for example, that the term 'fairness' is important, there are deep political and social differences about what constitutes fairness (Binns, 2017) In addition, based on the interpretation of principles, certain groups of people may put emphasis on a certain principle more than on others, leading to further concerns in interpretations (Winfield & Jirotka, 2018). The point now arises: how does one overcome this limitation of differences in interpretation? This can be achieved by ensuring that the governance framework created is more concise. This will require that each principle identified to be part of the governance framework is defined, limiting the interpretation differences (Winfield & Jirotka, 2018). Thus, as a core AI principle, it is noted that each term that is part of the AI governance framework should be defined.

5.2.2 Principles Are Highly General

Another concern in regard to governance of AI principles is that the principles are highly general in nature (Whittlestone et al., 2019). This means that they can serve as a kind of a checklist to be taken into consideration, however, from a practical point of view, they may not be useful due to the generalness of the principle (Beauchamp, 1995). Principles that are currently elaborated are very broad, for example, AI should be used for the common good, which everyone can agree on, but, from a practical perspective, what does that mean (Winfield & Jirotka, 2018)? An example of a narrower principle is not to use AI to develop autonomous weapons (Winfield & Jirotka, 2018). This is a much more specific principle but in essence is limited to a specific scenario in specific sectors. A balance between highly general and too specific principles is required in an AI governance framework. This can be achieved in an AI governance framework by each principle in a framework being divided into smaller concerns, creating more concise explanations. Hence, as a core AI principle, each principle identified should be divided into smaller concepts, creating more concise explanations.

5.2.3 Conflict in Practice

The last limitation of AI principles lies in the fact that a specific principle may conflict with what takes place in practice in the world of work (Winfield & Jirotka, 2018). For example, a current AI principle from the UK House of Lords AI Committee states that "it is not acceptable to deploy any artificial intelligence system which could have a substantial impact on an individual's life, unless it can generate a full and satisfactory explanation for the decisions it will take" (Winfield & Jirotka, 2018, p. 10). From a pure principal perspective, this has good intentions, but when applied in practice it results in a conflict. For example, today there are algorithms that can diagnose medical conditions better and faster than a human doctor, however, there is no concrete explanation of the algorithm (Song et al., 2018). The benefit of using this algorithm in conjunction with a human doctor may save lives, but due to the principle mentioned above, such technology would not be deployed. Some developments may be so beneficial that trade-offs would need to be made and this is an example of such a case (Price, 2017). Using the blanket principle would stifle potential AI uses and thus cause a conflict between the principle and what takes place in practice. To overcome this limitation, any AI governance framework developed must be presented to persons in practice to identify if there is any conflict that may arise with application in practice. Accordingly, each item raised in the AI governance framework, with its explanations and definitions, should be provided to persons in practice for further insight.

From the above there are three key aspects described regarding principle concerns, namely that principles are general; they conflict in practise, and interpretation of principles could vary. Each of these aspects would need to be addressed to overcome the principle concerned. The next aspect is procedural and structural governance mechanisms.

5.3 Procedural and Structural Governance Mechanisms

When creating an AI governance framework, there are different governance mechanisms that come to the fore. These include structural mechanisms and procedural mechanisms (Schiff et al., 2020). The discussion will now look at these two different governance mechanisms and conclude on the mechanism suitable for this study to develop an AI governance framework.

5.3.1 Structural Mechanisms

This mechanism is established in the notion of creating an AI governance council rather than AI governance frameworks (Schneider et al., 2020). This council would handle complex AI-related questions, including the interrelation between model outputs, training data, regulatory, and business requirements (Reddy et al., 2020). This council would comprise of (i) roles and responsibilities, and (ii) the allocation of decision-making authority (Borgman et al., 2016). Using structural mechanisms within AI governance is not well researched and very sparse data is currently available to understand the mechanics around using this approach (Ho et al., 2019). In addition, this approach is counterintuitive to the objective of this study. Accordingly, given the sparse research in this area of governance and the direct contradiction to the objective of the study, structural AI mechanisms will not be explored further. Rather, another form of governance mechanism will be employed. This brings the discussion to the next form of governance mechanism that is available, namely procedural governance mechanisms.

5.3.2 Procedural Governance Mechanisms

Procedural governance mechanisms refer to the creation of processes to ensure that AI systems operate correctly and efficiently (Schneider et al., 2020). It is entrenched in the notion that AI systems developed meet legal requirements, company requirements and policies with respect to explainability, fairness, accountability, security, and safety.

Given that this study's objective is to create an AI governance framework that is built on governance processes, this mechanism is perfectly suited to be adopted within this study. In addition, there is an abundance of research in this area. Thus, the study will employ aspects from this governance mechanism.

Included within the procedural governance mechanism approach are the following aspects: (iii) processes; (iv) procedures; (v) performance measurement; (vi) compliance monitoring; and (vii) issue management (Abraham et al., 2019). Each of these elements will be discussed in detail below.

Processes and procedures include the creation of standardized, documented methods and steps to follow to accomplish a specific task through use of AI (Zhang et al., 2020). The governance framework should include standardized points including different steps to follow to reach a specific outcome. This will form the basis of the creation of the AI governance framework, and this is noted as a core AI principle to develop the governance framework. The next aspect in the governance mechanism is compliance monitoring (Abraham et al., 2019). Compliance monitoring includes enforcing the conformity with any regulatory requirements, such as general data protection regulation (GDPR), the Protection of Personal Information Act (POPIA), or organizational requirements (Brundage et al., 2020). The AI governance framework to be created should include aspects of compliance monitoring when necessary and thus this is included as a core AI principle. Performance management is also included within this mechanism (Abraham et al., 2019). The AI governance framework to be created should include aspects to understand the performance management of an AI system. Ongoing health and performance checks of an AI system is an important aspect to help understand the functioning of an AI system. Thus, as a core AI principle, performance management is included. The last aspect is issue management, which refers to the identification and management of any AI issues (Abraham et al., 2019). The AI governance framework to be developed should include the notion of issue management as a core principle. This will be embedded in the procedures and processes created.

5.3.3 Relational Governance Mechanism

Relational governance mechanism is the facilitates the collaboration between stakeholders. This includes important aspects of training and communication. Training employees on AI is critical as stated Schneider et al. (2020). This training can take various forms of either training employees on how to use new AI technologies or it could take the form of training re-training employees who have been replaced or augmented by AI technology (Schneider et al., 2020). Communication is also another factor that is critical in relational governance. Effective communication allows employees fears regarding AI to be reduced. Thus, these aspects of communication and training should be embedded within an AI governance framework.

To sum up, the core AI principles that should inform the AI governance framework include aspects of:

- Processes and procedures (that is, creation of standardized, documented methods and steps to follow to accomplish a specific task using AI)
- performance measurement and, more specifically, ongoing health and performance checks of an AI system
- compliance monitoring, which relates to enforcing the conformity with any regulatory requirements and
- issue management, which relates to identification and management of any AI issues.

The discussion will now delve into overarching themes that have emerged when identifying AI governance and ethical concerns.

5.4 Overarching Ethical Concerns

According to Mittelstadt et al. (2016), when dealing with AI governance, there are different themes that may arise. Mittelstadt et al. (2016) separate these themes into two categories, namely epistemic and normative. Epistemic concerns are those which are inherent within the knowledge of AI, whereas normative concerns stem from the use of AI. Epistemic concerns, according to Mittelstadt et al. (2016), has two sub-categories, namely, inconclusive evidence, and inscrutable evidence. Normative concerns have two sub-categories, namely, unfair outcomes, and traceability. These different themes will influence the way in which AI governance is managed within an entity. The discussion will now delve deeper into each of these categories to provide insight into how this could impact the AI governance framework from a core principles perspective.

5.4.1 Epistemic Concerns

Inconclusive Evidence

The first theme identified is inconclusive evidence. Inconclusive evidence relates to conclusions drawn by algorithms using inferential statistics and/or ML techniques, which produce probable yet unavoidably uncertain knowledge (Mittelstadt et al., 2016). Recognizing this limitation is vital as one should always consider the risk of being incorrect and its relation to one's responsibilities (Miller & Record, 2013). Thus, a core AI principle that should be addressed in an AI governance framework is that AI systems can produce knowledge that is uncertain.

Inscrutable Evidence

The next theme is instructible evidence. It is reasonable to expect that when data is used as an input, there is a correlation between the data and the conclusions drawn, and that these correlations are accessible to scrutiny or critique (Mittelstadt et al., 2016). This is, however, not the case with ML, where there is a lack of knowledge as to the data points used and how these are interpreted (Mittelstadt et al., 2016). This creates practical and principles limitations (Mittelstadt et al., 2016). Thus, as a core AI principle, managing and understanding input data is essential, including monitoring the data on an ongoing basis, which must be prevalent in an AI governance framework.

5.4.2 Normative Concerns

Unfair Outcomes

Algorithms that produce well-argued, conclusive evidence could still be regarded as ethically inappropriate as the actions taken could be discriminatory (Mittelstadt et al., 2016). Moreover, the mere use of AI technology could result in unfair outcomes. This is a key aspect within the AI governance framework. Thus, as a core AI governance principle, the consequences of creating an AI system must be understood.

Traceability

The harm that could be caused by algorithms is difficult to detect and the cause is not easy to find. It is even more difficult to detect who should be held accountable (Mittelstadt et al., 2016). Accountability as an overarching theme is noted by

Mittelstadt et al. (2016). Therefore, as a core AI governance principle, accountability should be entrenched within the AI governance framework.

To sum up the above discussion, when developing the AI governance framework, it should be noted that AI can produce knowledge that is uncertain. In addition, AI systems inherently create practical and principles limitations due to uncertainty of input and output of data. It then coincides that input data is a key aspect in any AI solution. Moreover, the consequences of creating an AI system must be understood and, lastly, accountability should be entrenched within the governance framework. Reasons for creating AI governance frameworks will now be addressed in further detail.

5.5 *Reasons for Creating AI Governance Frameworks*

There are various reasons as to why a business would need or want to create an AI governance framework. Literature has identified four typologies for the creation of a governance framework (Schiff et al., 2020). These typologies, which will be described below, include social responsibility, competitive advantage, strategic planning, and strategic intervention.

5.5.1 Social Responsibility

The first reason for creating a governance framework is the motive of social responsibility (Schiff et al., 2020). This involves enhancing social benefit and removing harm. Many groups have created governance frameworks with this aspect in mind. These include the IEEE's Ethically Aligned Design, multi-stakeholder document, and the OECD principles. When creating the AI governance framework in this study it will be important to include aspects that promote social responsibility as this is one of the current motivations for creating AI governance frameworks globally. Thus, social responsibility will be noted as a core AI principle.

Competitive Advantage

The second reason is competitive advantage (Martinho-Truswell et al., 2018). This can take the form of economic and political advantage. This is prevalent in *China's New Generation of Artificial Intelligence Development Plan*, which describes AI as the new focus of international competition (State Council of China, 2017). Accordingly, business may create AI systems to gain a competitive advantage. It will be important to integrate competitive advantage within the AI governance framework. This could be achieved by not limiting innovation but rather promoting innovation with a social conscience. Thus, promoting innovation with a social conscience will be noted as a core AI principle.

Strategic Intervention

The next motivation for creating a governance framework includes strategic intervention (Schiff et al., 2020). This is based on the external environment of the entity. This lies in the notion that an entity would want to intervene in the environment, including legal, social, or socio-economic realms in which the business finds itself (Microsoft, 2018). For example, organizations may develop voluntary ethical AI frameworks to pre-empt regulations, thereby avoiding more restrictive laws being passed. Within this study, the AI governance framework should take into consideration strategic intervention. This will be in the form of the AI governance framework addressing, for example, socio-economic concerns and other concerns relating to the immediate environment in which the entity operates. Promoting strategic intervention with a social conscience will be noted as a core AI principle.

Motivation for Signalling Leadership

The last reason is signalling leadership (Schiff et al., 2020). Signalling leadership is an important aspect for any entity and this could be a driving force behind creating an AI governance framework. This would drive any entity to be a leader in the specific field. This typology is orthogonal to the ones above. Thus, the signalling leadership reason will inherently be embedded within the governance framework, once created.

The next section to be described is the discussion on the four layers to create an integrated AI governance framework.

5.6 *Four Layers to Create an Integrated AI Governance Framework*

There is limited literature regarding the creation of AI governance frameworks. However, from the literature that is available, it is noted that there are four layers in creating AI governance frameworks. The four layers include: (1) AI technology, services, and applications layer; (2) AI challenges layer; (3) AI regulation process layer; and (4) Collaborative AI governance layer (Wirtz et al., 2020). Each of these layers will be discussed in detail below.

5.6.1 AI Applications/Services and Technology Layer

This layer entails the gathering and processing of data to reach a specific result. Bataller and Harris (2016) have proposed that, as part of this layer within an AI governance framework, three aspects need to be considered, including identifying, understanding, and actioning data to reach a conclusion. Identifying data would involve a process of sensing, which involves collecting data from the environment. This environment could include already known data sets or other sources, such as cameras, tactile sensors, microphones, etc. (Bataller & Harris, 2016). After receiving the data, the data needs to be further processed for understanding to take place. The algorithm needs to gather information to create a virtual knowledge base. This knowledge base will be analysed for patterns and other correlations (Bataller & Harris, 2016). This then leads to an actioning phase. The actions phase could take various forms, including, for example, the machine learning from the data or even humans actioning the outcome instructions from the algorithm (Bataller & Harris, 2016). Challenges to business may occur at any of these steps and thus developing an AI governance framework which governs each of these aspects (that is, identifying, understanding, and actioning) is essential (Wirtz et al., 2020). Therefore, AI applications/services and technology layer intervention will be noted as a core AI principle.

AI Challenges Layer

The next step in the fours layers is the AI challenges layer. The AI challenges layer consists of two aspects: AI law and regulation; and AI society.

AI Law and Regulation

AI law and regulation refers to standards, norms, and legislation that are established for various technologies. Some of the key aspects that fall under AI law and regulation include the governance of autonomous intelligence systems, responsibility and accountability, and privacy and safety (IEEE, 2017). Governance of autonomous intelligence systems refers to the black box effect (that is, the system takes decisions based on unknown information and does so without human intervention) (Bleicher, 2016). This could take many forms, including, but not limited to, autonomous cars making decisions when used on the road, or autonomous weapons being deployed (Heyns, 2014). Any governance framework that is developed should address the black box effect to eliminate actions that are taken by autonomous AI. The second point under AI law and regulation is responsibility and accountability. This is a key aspect that must come across in any AI governance framework. It addresses the point as to who will be held legally and otherwise responsible for the actions of an AI system (Helbing et al., 2017). Due to self-learning embedded within the AI systems, it could become a tricky situation to identify who will be held responsible. The last point under AI law and regulation is privacy and safety. This deals with securing human rights and individual data to unauthorised access, for example, accessing the location of the user via an application. Without explicit consent, the data obtained endangers the privacy of the individual (Coles, 2018).

Governance frameworks should include this aspect of privacy and safety within their ambit.

AI Society

The next aspect under the AI challenges layer is AI society. AI has shaped many different areas of daily life, including aspects such as transportation, education, surveillance, and public safety (Stone et al., 2016). Using these technologies, there is a concern that automation through AI could have far-reaching consequences for society (McGinnis, 2010; Scherer, 2016). When creating an AI governance framework, scholars have identified five aspects that should be included from an AI society perspective, including: workforce transformation, social acceptance, human interaction with machines, moral dilemmas, and rulemaking for humans.

In regard to workforce transformation, AI can have a huge impact on jobs, for example, in a study by Frey and Osborne (2017), which reviewed over 700 jobs it was noted that AI could replace 47% of the jobs. Addressing the impact of jobs within an AI governance framework will be key to ensure that AI does not impact society in a negative manner. The next aspect to discuss is social acceptance. For the use of AI to flourish and have a positive impact on society, social acceptance should be in place (Scherer, 2016). This can be achieved by business using governance frameworks that promote the beneficial use of AI (Scherer, 2016). The next aspect under AI society is human interaction with machines. Interaction with machines takes place every day, for example, a computer making decisions and humans acting on those decisions, or something more menial, such as speaking to an assistant like Siri or Google assistance. This adds a blur between human and machine as you are not easily able to distinguish between them. This aspect of the blur created between human and machine would need to be addressed in the AI governance framework. The next aspect to be discussed under AI society is moral dilemmas; moral dilemmas can occur when a machine must decide between two different options, with both having conflicting moral and ethical values. Rules can be written within the AI system to take a certain action but there is no certainty that those rules will remain the same once the system learns (Lin et al., 2008). An AI governance framework would need to address such aspects, as following the written rules at all costs could also negatively impact the outcome of the system. The last aspect for AI society is AI rulemaking for humans. There is no emotion or consciousness within an AI system, which is good for an AI system to reach a certain goal, but it may result in unintended consequences for humans. These unintended consequences would need to be addressed as part of the AI governance framework (Banerjee et al., 2017).

Based on the discussion above, the AI governance framework should include aspects of job transformation to eliminate negative effects. Regarding the blur between human and machine, the AI governance framework must address who is responsible and accountable for various actions undertaken. To overcome moral dilemmas, the AI governance framework should continuously monitor the various outcomes of the system and adjust the results accordingly, and lastly, unintended consequences for humans should be addressed in the framework by undertaking a full risk assessment before the AI solution is implemented. These aspects must be included in an AI governance framework to ensure AI society is taken into consideration.

AI Regulation and Process Layer

The next layer in this four-step layer process is the AI regulation and process layer. Like König et al. (2010), the regulatory process proposed by Wirtz et al. (2020) comprises the concepts of framing, risk and benefit assessment, risk evaluation, and risk management. All these concepts will be discussed in detail below. The first principle in the AI regulation and process layer recommends framing (Wirtz et al., 2020). In this step, stakeholders need to be consulted to understand the problem and define the way in which the problem can be overcome. Through this process, risk, benefits, and costs must be taken into consideration.

The next principle in the AI regulation and process layer is evaluation of risk. Experts would need to collect data to perform an assessment of risk (Wirtz et al., 2020). This assessment of risk will guide the AI process. The risks and benefits need to be evaluated, including understanding the impact on various parties.

The next principle is risk management. This step takes all gathered information, processes the information, and chooses the way forward (Wirtz et al., 2020). The process is then evaluated on an ongoing basis to understand if any changes need to occur. The process should also consider the short to medium term, as consulting with stakeholders can be a long, drawn-out process (Wirtz et al., 2020).

Within the AI governance framework, the following core principles must be addressed for AI regulation and process, Firstly, various stakeholders must be included, through a consultative process, in identifying the AI problem and the manner in which the problem can be overcome. Next, the risks of AI should be evaluated, including the data collected. The risks and benefits should be evaluated to understand the impact on various parties. Lastly, risk management and ongoing monitoring should be embedded in the AI governance framework.

6 Conclusion

As AI is more widely used in business there are concerns that the corporate governance principles surrounding these technologies are not developed or implemented within business. Business is continuously using these technologies to make crucial business decisions that impact all stakeholders. The call to develop governance principles by stakeholder groups are more prevalent. The study identifies eight broad themes with various overarching corporate governance principles that need to be prevalent in an AI governance framework for South Africa as summarised in Fig. 2. These include; (1) Principle concerns, (2) Procedural governance

Fig. 2 Core AI Governance Principles Informing the Development of the AI Governance Framework. Source: Own deduction

mechanisms, (3) Overarching ethical concerns, (4) Reasons for creating AI governance frameworks, (5) AI applications and technology layer, (6) AI law regulation, (7) AI Society, (8) AI regulation and process layer. It is essential that business start considering these themes when developing an AI governance framework that will be implemented. Using the outcome of this study could lead to a self-regulated AI governance framework similar to one of the King IV™. There are several limitations also prevalent in the study. The study employs a documentary analysis approach and thus inherently there could be academic articles that were not considered in the study. In addition, the study is limited t o a certain time frame till 2022 and new studies post 2022 will not be considered.

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Identifying Decision Variables in Tax Clinic Design: A Scoping Review

Kerry de Hart and Neo Molefi-Kau

Abstract South Africa has a rich history of clinical education programmes. However, the same cannot be said of tax clinics. No prevailing literature could be found which reports on the use of tax clinics as part of an education programme at South African Universities. To change this status, the researchers embarked on a process of considering initiating a tax clinic at a university. As a preliminary phase, a scoping review was employed to identify the decision variables involved in initiating a clinical education programme at a university. This scoping review began with the researchers considering, in a pragmatic manner, what decisions would need to be made for the establishment of a tax clinic at a university. Decisions made in this respect were found to be substantially influenced by the clinic's purpose and objectives. Examining the literature yielded three overarching categories of decisions associated with the design of such an initiative, namely, institutional decisions, target audience, and operational considerations. The paper presents a framework of these decisions.

Keywords Clinic · Clinical education · Scoping review · Tax clinic · Taxation education

1 Background

Clinical education has different connotations depending on the discipline for which it is created (Cantatore et al., 2016). In higher education, clinical education mostly involves planning curriculum activities in response to various issues related to educational, societal and professional needs (Oermann et al., 2017). Although there are numerous definitions of clinical education, certain commonalities may be noted within those definitions. Chakraborty (2017) has defined clinical education as the instructional method used for teaching professional skills and values in an

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experiential learning environment. Jelinic and Koch's (2020) definition is similar in that it defines clinical legal education as a teaching method which promotes growth of personal skills, knowledge, and values through experiential learning. Kotonya's (2022) definition adds the aspect of social justice and defines clinical legal education as a practical learning opportunity for students to promote social justice through assisting disadvantaged persons with legal services. Kotonya (2022) further adds that the provision of legal assistance in clinical education is carried out under supervision of qualified personnel. Jelinic and Koch's (2020) definition supports Haupt's (2006) earlier definition which defines clinical legal education as a teaching methodology where students learn by providing legal services to the indigent. Haupt's (2006) definition also includes the aspect of social justice within clinical education, a view echoed by Maisel (2006).

Deduced from these definitions, one may agree that clinical legal education is a teaching method, which provides a supervised, practical learning environment for higher education students. Including social justice, as inherent in a definition of clinical education, is open to discussion, yet it may be understood as a "by-product" of this teaching method (Kotonya, 2022). For this study, clinical education is defined as a teaching method where students, under guidance, provide services to members of a defined community (see Target audience) to gain practical, professionalised experience.

South Africa has a rich history of clinical education programmes relating to legal studies, dating as far back as the 1970s (du Plessis, 2019). No prevailing literature could be found which reports on the use of tax clinics (even as part of law clinics) as a clinical education programme at South African Universities. Globally, the earliest "tax specific" clinics, were established in the 1970's in the United States. These clinics originated as academic interventions to address students' skills and experiential learning gaps, whilst simultaneously assisting the community by providing free or low-cost legal and tax services (Fogg, 2012). Most tax clinics continued as education programmes that are housed in higher education faculties to teach students practical skills that prepare them for their professional careers (Book, 2015).

The use of clinical education is motivated by several benefits to students, the academics involved and the community. Notwithstanding the benefits, a hands'-on and resource-intensive teaching method, that also has a direct interface with society, specifically unrepresented individuals, also includes risks. The balancing of benefits and risks is a well-known convention which guides specific knowledge and practice insights within a specific domain (Fischhoff, 2015). The researchers chose a deliberate focus on the impetus around understanding the designing and development of a tax clinic, given an envisaged applied outcome. The term "design" for the purpose of this study needs to be interpreted in the context of refers "to constructing according to a plan" as defined in the Merriam-Webster (n.d.) online dictionary. The framing convention therefore retained conceptual openness for the contrary views that the data, inductively, would suggest. In the next section, the benefits of clinical education that could motivate the initiation of a clinical programme, will be described.

2 Motivation for Using Clinics as Part of a Curriculum

Internationally employers call for graduates who are capable of applying their discipline-specific knowledge in the workplace (Viviers et al., 2018). Changes in the business world, coupled with globalisation, advances in technology, corporate scandals and increasing regulations, have created the need for accountants to demonstrate a wide range of both technical and pervasive skills (Keevy, 2020). Employers of accounting graduates have criticised graduates' ability to work well with others and think critically (Kotze & Miller, 2023). While accounting graduates gain exposure to specific skills during their training contracts, employers anticipate these graduates to already possess a certain level of professional skills when they begin their practical training (Doman & Nienaber, 2012; Kunz & De Jager, 2019). As accounting education providers, tax educators in higher education must develop a tax curriculum that can produce graduates with strong technical knowledge and pervasive skills to better prepare their graduates for the formal workplace (Ghani & Suryani, 2020; Van Oordt & Mulder, 2016).

With the expectation of certain graduate capabilities that students should demonstrate on the completion of their studies, innovative ways of developing such capabilities need to be established (Castelyn et al., 2020). Literature supports the idea of clinical education, not only as a benefit to the students involved but through a multi-dimensional perspective, which includes academia (and the institution) and the community (Blanthorne & Westin, 2016). Through clinical education, students are afforded valuable learning opportunities (Allen et al., 2012). Capabilities that may be enhanced through this teaching method may be attributed to the three main areas of technical, communication and interpersonal capabilities, as well as improved individual, personal capacities (Blanthorne & Westin, 2016).

For academia involved in tax clinics the benefits include improved relationships with students and community, professional tax practice development, exposure to a variety of teaching approaches and providing opportunities for research (Kmak & Minashvili, 2021; Strupeck & Whitten, 2004). Benefits to the institution include community goodwill and increased visibility, while tax clinics' altruistic advantages may also be in line with the mission or strategic plan of a university, which generally require a socially engaged higher education system (Hulsart, 2007; Strupeck & Whitten, 2004). The community, where the clinic is situated, may benefit from improved tax compliance and better financial well-being within society as well as receiving the services offered for free (Allen et al., 2012; Blanthorne & Westin, 2016).

In summary, there are convincing reasons and evidence-based support in favour of the benefits and affordances of clinical education. However, introducing such concepts to universities also poses complexities and challenges (Fischhoff, 2015). Literature also contains several such considerations and decision-making areas that should be contemplated when embarking on a clinical education venture. To be open to the continuum, the researchers used a scoping review, driven by a central summative question (see Sect. 3.1), to explore the range of considerations or decision variables when embarking on a clinical education venture at a university.

3 Methodology

A scoping review methodology was used to identify citations for the scope of this paper which intended to be the initial consideration of demarcated data points isolated by the researchers' question, presented below. The data of full text citations were analysed thematically to identify design decision variables that need to be considered in the establishment of tax clinics. A scoping review is described as a preliminary assessment of potential size and scope of available research literature which aims to identify the nature and extent of existing research on clinical education (Grant & Booth, 2009). Scoping reviews are often used to appraise existing literature to cover implications for practice (Tricco et al., 2016) and to map key concepts (Smit & Scherman, 2021). Both intentions drive the envisioned outcome of the research project.

As a preliminary phase, a scoping review with a pragmatic purpose, was used to identify the decision variables involved in designing a clinical education programme at a university. This scoping review began with the researchers' considerations, in a pragmatic manner, of what decision variables should be considered for the establishment of a tax clinic at a university while also respecting inter-disciplinary issues of tax education and curriculum development. The researchers worked together to arrive at the broad research question to be addressed as well as ascertaining the study protocol which included the identification of search terms and which databases to search. As alluded to, this is part of a larger research project. It made sense then, initially, to discern the landscape, using a focused scoping review to follow an exploratory phase of the study.

The methodology for this scoping review was based on the framework outlined by Arksey and O'Malley (2005). The review included the following key steps as set out in the framework: 1. Identifying the research question, 2. Identifying relevant studies, 3. The selection of studies, 4. Analysing the data, and 5. Collating summarising and reporting the results.

3.1 Step 1: Identifying the Research Question

As is documented practice, the scoping review was guided by a summative, substantive question relevant to the intentions and outcomes of the research project (Grant & Booth, 2009). Therefore, the following was posed: "What decision variables does literature suggest, should be considered for the design of a clinical education centre?". For the purposes of this review and its convening orientation, clinical education was limited to clinics that offered advisory services. Medical clinics were excluded as they provide physical services. Only clinics run by universities were considered.

3.2 Step 2 and 3: Identifying Relevant Studies and Selection of Studies

The initial search was performed on 20 January 2023, using Scopus, a multidisciplinary database. This data base was selected as it is comprehensive (Dinh et al., 2023). The search query was translated into the database's platform's command language and sources were searched for, using the following key concepts: "legal clinic" or "law clinic" or "tax clinic" or "volunteer income tax assistance" as well as all inflections of the words. The search produced 1285 citations (Fig. 1).

All citations were imported into a Microsoft Excel spreadsheet and duplicates were manually removed using conditional formatting of authors and titles. Where citations had no abstract, the title alone was reviewed for high relevance (336 citations), otherwise the abstract was reviewed for eligibility. Citations that were not English were excluded. A two-phase screening process was carried out in selecting the studies, these phases are discussed below.

3.2.1 Phase 1: Title and Abstract Screening

For the first phase of screening, only the title and abstract were screened for relevance and citations that did not meet the minimum criteria were excluded. Citations that were not reporting on university clinics were excluded. Citations that were reporting on medical clinics were excluded. Citations that were deemed irrelevant in that they did not relate to the conceptual orientation as discussed thus far, were excluded. The title and abstract from each citation were independently screened by the two researchers. The researchers met throughout the process to resolve conflicts and to discuss uncertainties. Additionally, an external methodology expert was consulted around ensuring robust approaches for the scoping review design.

3.2.2 Phase 2: Full Text Inclusion

In the furtherance of the research question, an *a priori* decision was made to textually search for the words "design" and "develop" in the titles and abstracts of the relevant citations (those remaining after Phase 1). The textual search revealed 35 citations. From these citations the full text was found for 33. The full text sources were uploaded to the document function of ATLAS.ti™, Version 23 (hereafter ATLAS.

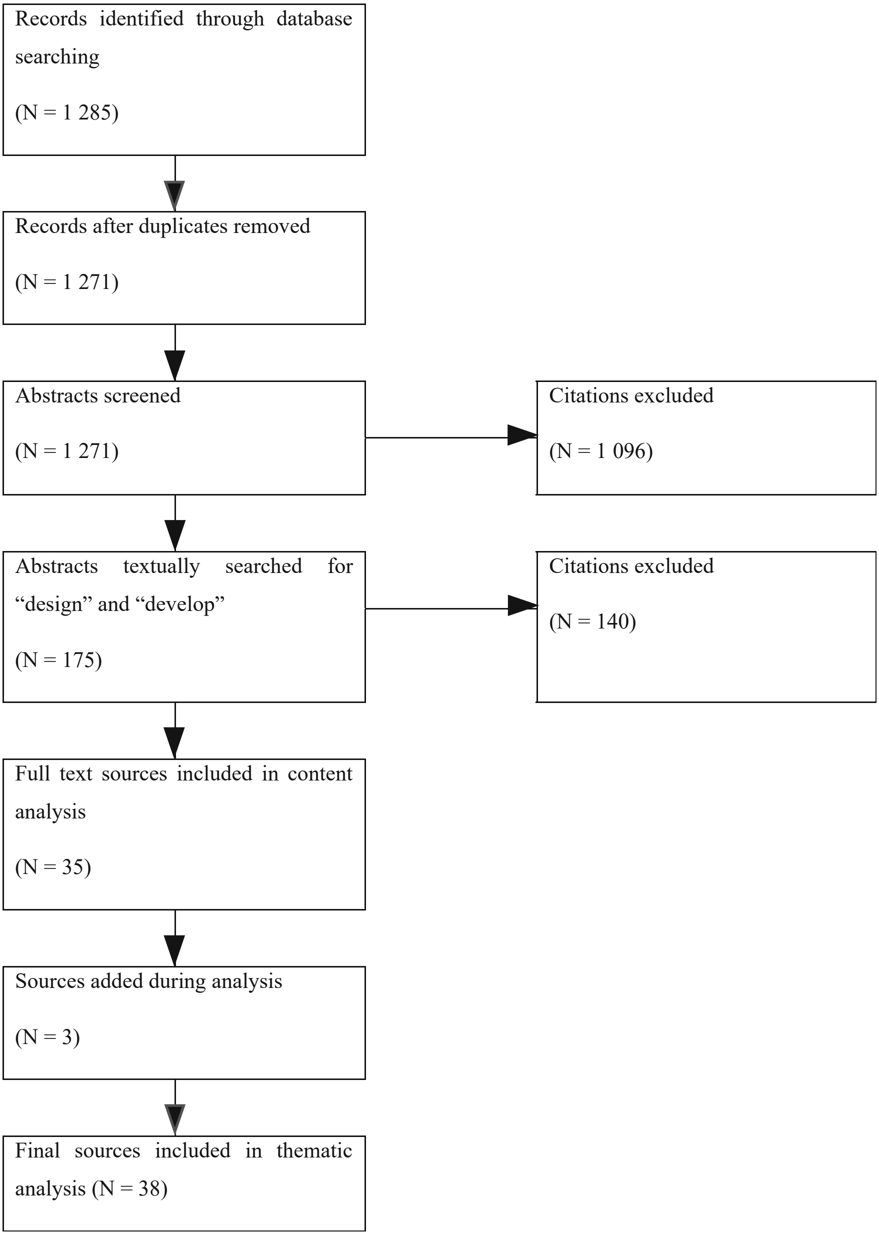

Fig. 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow chart for the full text study search

ti) for transparent data management and to systematise the analysis (Friese et al., 2018). ATLAS.ti is a computer-assisted qualitative data analysis software that assists and facilitates literature reviews as well as analysis of data for qualitative research.

While analysing the documents one full text was found to be a book, three chapters of the book were applicable to the study and included as full text which meant that 35 full text sources were included in total. While carrying out the thematic analysis phase it became apparent that a special edition of The Journal of Australian Taxation (volume 22(2)) reported on the development of ten tax clinics in Australia. The 35 sources included up to this point for analysis overlooked the reports of three of the ten tax clinics. These sources were included in terms of their relevance to the current study which resulted in 38 sources being included for content analysis, as driven by the research question.

3.3 Step 4: Analysing the Data

The researchers chose to extract information from the selected sources on the design considerations for initiating a tax clinic. Joanna Briggs Institute (JBI) Scoping review guidance recommends using basic qualitative content analysis (Aromataris & Munn, 2020). The researchers continued to use ATLAS.ti for this step of the analysis. Basic content analysis is a descriptive approach that involves a process of open coding. The codes are then allocated to overall categories (Pollock et al., 2023). There are three phases of qualitative content analysis (Elo & Kyngas in Pollock et al., 2023), namely: (1) preparation, (2) organising and (3) reporting. The analysis made use of a codebook. The codebook was used to map the developing analysis and to create reliable and accurate definitions of the codes being used (Braun & Clarke, 2021). As the scoping review was carried out by two researchers, the use of a coding framework facilitated teamwork (Braun & Clarke, 2021). The included sources were coded inductively using semantic codes for design considerations supported by the open coding functions of ATLAS.ti (Friese et al., 2018; Saldãna, 2021).

3.4 Step 5: Collating Summarising and Reporting the Results

Once the researchers had familiarised themselves with the literature, initial codes were generated through consensus. While open coding the documents, new codes were also introduced. Once all the documents were coded in ATLAS.ti the researchers developed a codebook in Microsoft Excel which included higher order categories and subcategories of codes with relevant definitions. The codes were clustered into 20 subcategories. The researchers then clustered the codes into overarching (higher order) categories. The categories were reviewed, named and defined. The overarching categories were operational, institutional and audience considerations. The researchers then applied their minds to the intuitive sequence in which the decision variables need to be considered to facilitate a logical discussion of the findings.

4 Results

Intuitively, the first step for anyone starting a clinic involves making an initial decision regarding the purpose of the clinic. The purpose will influence various aspects of the clinic, such as its structure, staffing, location, and operating hours. Based on the literature reviewed it was found that most clinics had more than one purpose. One common purpose identified in the reviewed clinics is providing advisory services where students, under supervision, interacted with the community (Castelyn et al., 2020). In addition, several of the clinics combined the advisory purpose with that of an education purpose, where students arranged activities or provided resources to educate the community (Castelyn et al., 2020; McLaren, 2020; Raines & Walpola, 2020; Vitale & Cull, 2020). Certain clinics also had a research purpose, they published journal articles and collaborated with the tax authorities based on recommendations from their research efforts (Whait, 2020). Most clinics expressed a shared commitment in serving communities that would otherwise not have had access to the valuable advice they were offered (Abeysekera, 2020; Castelyn et al., 2020; Le & Hoyer, 2020).

The review demonstrated that once the purpose and structure of the clinic were addressed, the design decision variables fall into three overarching themes, discussed below, namely: (i) institutional decisions (which included decisions related to academics and students); (ii) target audience; and (iii) operational decisions. The decision variables in each of the three overarching themes will be discussed and the researchers will attempt to present these as a framework of decision variables that should be considered when designing a tax clinic.

5 Discussion

As the clinics reviewed relate only to university clinics, the discussion will commence with a consideration of institutional decision variables. After The consideration and discussion of the institutional decisions will be discussed, the paper will move onto the followed by a consideration of the target audience, and finally a consideration of the operational decisions.

5.1 Institutional Decisions

A clinical programme must be supported by the institution to be successful (Allen et al., 2012). Decision variables falling under this overarching category involve making choices directly related to the clinic's objectives. These decisions encompassed determining the educational significance of the clinical experience, the involvement of academic staff, and establishing expectations for students, including recruitment methods.

5.1.1 Purpose

The purpose of a clinic, whether it be for students to earn academic credits or solely for their voluntary participation and community benefit, will have implications for other operational aspects (Blanthorne & Westin, 2016; Kotonya, 2022). The overall objective of the clinic will influence expectations placed on students. Credit-bearing clinical activities will necessitate ensuring that there are enough clients to fulfil the student's practical requirements. Literature generally indicates that the risk of credit-based involvement is reduced enthusiasm for participation (Blanthorne & Westin, 2016; Castelyn et al., 2020). In cases where students engage in the clinic activities for credit, there are pedagogical and assessment considerations (Blanthorne & Westin, 2016). These considerations require the involvement of academic staff and professionally driven standards.

5.1.2 Academic Staff

The consideration regarding the extent of engagement of academic staff in clinic design is connected to the clinic's purpose. If the clinical activities carry academic credits, it is essential for teaching staff and college leadership to participate in formulating and executing the curriculum (Rosenbaum, 2016). For this kind of programme to be accepted as part of a university's offering, it should be linked to academic coursework and considered an academic responsibility (Allen et al., 2012). Even in cases where the clinic is not associated with academic coursework, it was observed that the participation of academic staff is still considered important (McLaren, 2020; Vitale & Cull, 2020; Whait, 2020). In such situations, academics may contribute by offering supervision and guidance in the clinic's activities (Raines & Walpola, 2020). The extent of academic participation also impacts upon the level of external supervision required to support the students in carrying out clinical activities (McLaren, 2020).

5.1.3 Students

The involvement of students in the clinic is influenced by the clinic's purpose, whether it is for credit or not. However, since the clinic interacts with the public, it is evident that most clinics implement some form of recruitment process (Allen et al., 2012; Gannaway et al., 2008; Le & Hoyer, 2020; Vitale & Cull, 2020). In some cases where the opportunity to work in the clinic was initially open to all students who met certain conditions, subsequent iterations of the clinic introduced an interview process (Vitale & Cull, 2020). After establishing the purpose and institutional involvement of the clinic, the founder should then determine the target audience for the clinic.

5.2 Target Audience and Extent of Services

For clinical initiatives studied in the prevailing literature reviewed, specific decisions were made regarding which clients would be targeted and the extent to which services would be rendered to such clients. Considering available resources (which includes students, other staff and other resources) and the scope of advice that students are able to offer, clinics often establish restrictions with regard to "who" they will service. The approach of clinics varied in terms of the clients they aimed to serve, ranging from vulnerable and non-represented individuals to those within a low-income bracket and in some cases no income limits were applied (Jogarajan et al., 2020; Le & Hoyer, 2020; Mclaren, 2020). Firstly, the specific category of taxpayers which the clinic will cater for, which may include only individuals or small business, is determined. Secondly, they define the specific types of taxes that the clinic is willing to provide guidance on, such as income tax, Value-Added Tax (VAT, General Sales Tax (GST)) or prepaid taxes.

It is important for clinics to make deliberate decisions in this regard. Clinics should, however, be cautious not to compete with professional advisors in terms of the clients they serve and therefore provide a clear mandate statement (Le & Hoyer, 2020). Clinic managers may consider implementing a client-based selection process to determine the individuals to whom the clinic will provide services to.

Other than delimiting the client who the clinic would service, another important consideration is to manage clients' expectations regarding the scope of assistance that could potentially be provided by the clinic (Castelyn et al., 2020; Jogarajan et al., 2020). Services included tax disputes with the tax authority relating to audits, appeals, collection matters and litigation, lodging individual tax returns, and filling knowledge gaps.

Unlike tax practitioners, university clinics do not encourage repetitive visits by taxpayers. Tax clinics attempt to achieve this objective by shifting taxpayers through educating them, to a position where they were comfortable in meeting their tax responsibilities going forward (assuming their circumstances did not change)

(Jogarajan et al., 2020). Furthermore, it is also suggested that once a clinic's relationship with the community becomes established, more individuals should be encouraged to make use of such clinic's offerings through promotional activities (Chakraborty, 2017).

Following the consideration of the target audience and extent of services, there are many decision variables to be considered under the final overarching theme, namely the operational decisions. These are discussed in the next section.

5.3 Operational Decisions

The recurring themes, from the scope, that were grouped and named under operational decisions included the following: funding: location and equipping the premises, operating times, staffing, method of interacting with target audience and administrative decisions. Many of these decision variables are interrelated and affect each other. For purposes of this paper, we suggest that "funding" will determine the magnitude of the clinic and are therefore considered discussing this first.

5.3.1 Funding

A decision on how or where the initial and subsequent funding of a clinic will be sourced is a primary decision before a tax clinic can be initiated. Research exemplifies several ways in which existing clinics have been funded. For example, the initial outlay of funds required to support the running of the national tax clinic programmes in Australia was provided by the government (Abeysekera, 2020). In the United States of America (USA), legal clinics have various sources of funding which may include university grants, student fees, external grants and fundraising activities (Allen et al., 2012). Interestingly the Volunteer Income Tax Assistance (VITA) (USA) are mostly funded by the government, although these funds have decreased since the projects' inception (Blanthorne & Westin, 2016). Clinics in South Africa, like the USA, have various sources of funding which can include funds from industry professionals and associated organisations or professional bodies (Kotonya, 2022). The reviewed literature suggests that government (local or national) had a role to play in funding a number of successful clinics and therefore obtaining financial support from government could be a first principle in the sourcing of initial funds. If not available, other avenues will need to be used. Once the funds are secured, the founder can resolve decisions regarding location (premises), staffing and other administrative considerations.

5.3.2 Location and Equipping the Premises

Clinics mostly operated from a fixed, repurposed space on a university campus. Mobile or pop-up tax clinics were operated from time to time by fixed clinics, to reach clients in remote areas (Abeysekera, 2020; Le & Hoyer, 2020). There was one instance where a clinic was operated online or virtually, due to the Covid-19 pandemic (Whait, 2020). The premises from which a clinic operates has an impact on the type of service being provided because of the types of taxpayers who will have access to it and therefore a careful decision on where the clinic operates from, needs to be made. One could make use of a fixed location to create consistent access to a clinic, whilst pop-up and virtual clinics could be used to reach clients who would not be able to access a fixed location clinic. The decision on the location of the premises is closely linked to the decisions made regarding the target audience.

Where rent needs to be paid the choice of premises will be limited according to budgeted amounts. Cognisance should be taken of working arrangements when considering a premises. The premises should provide students and other volunteer staff with appropriate areas, like an office to work in, an office for interviews or telephone interviews, a reception where clients are received and a kitchen where students and staff can provide refreshments for themselves (Le & Hoyer, 2020; McLaren, 2020). As the clinic will be functioning as a professional tax practice, consideration will need to be given to equipping it in line with a fully functional office (Le & Hoyer, 2020; McLaren, 2020). Equipment would include basic technology, for example computers, printer, photocopier, reliable internet. Again, this will have to be performed within the funding budget. Once the location and equipping of the clinic was decided on, the next decision related to the operating times.

5.3.3 Operating Times

The decision in respect of days and hours of operation for a clinic is a foundational decision as many other decisions are based on it (Whait, 2020). The clinics, in the citations reviewed, significantly differed in terms of their operating times (both in days and operating hours) and although in many of the citations the authors do not have specific reasons for their choice of hours, these should be reasonable for staff and for the community they are serving (Whait, 2020). One aspect that governs the decision regarding days and hours is the number of students available for appointments, inclusive of their availability, as well as the hours that represent those most convenient to the population being served and client circumstances (Kayis-Kumar et al., 2020; Mclaren, 2020; Vitale & Cull, 2020).

Even though most of the clinics under review only operated during teaching semesters, it could be considered that clinics need to operate throughout the year to maintain their momentum (Freudenberg et al., 2020; Gannaway et al., 2008). It was also suggested that the risk of operating outside of tax filing seasons (most likely where the majority of a tax clinic's clients are individuals) might result in low demand for services during non-filing tax seasons and that operating hours could be adjusted during the year to consider the increased demand during tax filing seasons (Castelyn et al., 2020). It is suggested that opening hours need to be continually reviewed and expanded, or reduced, if needed (Vitale & Cull, 2020).

5.3.4 Staffing

As with operating times, the clinics had different organograms. The main areas that emerged were the involvement of academic staff, students, external stakeholders (especially professionals in practice) and administrative staff (volunteer, employed or students). The role of staff differed depending on the nature of the clinic (Kotonya, 2022). It is not worthwhile to report on all the different structures (see Reference list), but rather to discuss the considerations that should be given to staffing. It would be better therefore to weigh up the responsibilities which are identified with a clinic so as to ensure that these roles are allocated based on the size of the intended clinic and the available resources (funding and students).

One of the issues which affects staffing will be the legal requirements regulating legal advice. In some instances, clinics are exempt from regulations as they do not charge any consideration for rendering tax-advice and tax-related services, this "exemption regulation" is similar to South Africa, in terms of Section 240 of the Tax Administration Act (Tax Administration Act, 2011). In other cases, students were only allowed to operate under the supervision of registered and regulated tax practitioners. Where a tax practitioner is required when tax advice is given, then a decision would need to be made concerning the appointment of a registered tax practitioner, the use of an academic who is a registered tax practitioner or the pro bono services of one or more registered tax practitioners to supervise students (Whait, 2020).

In many instances, a clinic manager type position, is part of the staffing organogram. Often this position is held by the founding academic (Castelyn et al., 2020). If it is not an academic, then regard should be given to the skills sets of such a manager.

Consideration should be given to assistance with information technology (IT) support services, reception, marketing etc. In some clinics, students perform these functions while in others these roles are allocated to a person who is employed by the clinic (Allen et al., 2012; Blanthorne & Westin, 2016; Blaxell, 2014; Castelyn et al., 2020; Jogarajan et al., 2020). This dimension then inter-relates back to the credit-bearing considerations and shows the inter-relatedness of the decision-making processes for the clinics. Most clinics had a strict recruitment process (see Students) while others only required students to be registered for certain modules to be able to volunteer their services (Le & Hoyer, 2020; Vitale & Cull, 2020; Whait, 2020). One of the more important decisions regarding students is the form that the supervision of students will take, as students are dealing with "real" situations (see Supervision). It seems from the studies that were included (refer to reference list) that academics allocated to clinics were in general academics who had industry experience and could therefore supervise students.

Since most clinics operated from physical premises and clients typically visited in person, most interactions between students and clients occurred through face-to-face communication. However, it is worth noting that pre-interview interactions sometimes involved other forms of communication, like telephone, online or email.

5.3.5 Method of Interacting with Target Audience

The basic methods of communicating with clients included face-to-face, telephonically, as well as online. Face-to-face interactions proved to be the preferred method of interaction with clients (Blanthorne & Westin, 2016; Gannaway et al., 2008; Le & Hoyer, 2020; Raines & Walpola, 2020; Kayis-Kumar et al., 2020). Telephonic or electronic methods were used to interact with clients, in remote areas, who experienced challenges in accessing a clinic in person (Giddings, 2020; Raines & Walpola, 2020). The utilisation of electronic communication tools when used, were influenced by the clients' computer proficiency and internet access capabilities (Raines & Walpola, 2020). When designing a clinic, the decision regarding interaction will need to be taken so that any infrastructure (including the setup of a premises for private interviews) can be prepared. The available space for interviews will also have an impact on the interview bookings and on the student duty roster. Where other forms of interaction are chosen, decisions regarding IT support services would be required. These decisions are discussed in the next section.

5.3.6 Administration

Administration of a clinic involves multiple activities, including managing clients and staff, records management, budgets, marketing, and IT support services. As mentioned in the staffing discussion, the administrative function could be carried out by one person or shared by a team which would include the students and a manager. In terms of administration, first start-up or foundational decisions should be made (Freudenberg et al., 2020) and then decisions regarding the day-to-day functioning of the clinic. The next sections will list the tasks for which an administrative person or team could be responsible for.

Foundational Administrative Decisions Prior to commencing clinic operations, it is essential to ensure implementation of certain administrative aspects. The clinic's founder should consider all legal aspects of the clinic including developing templates for contracts with clients, establishing a contract that will be signed with "employees" or volunteers and students. Confidentiality agreements should be included in the contracts of individuals involved in clinical activities, given the sensitive nature of the shared information (McLaren, 2020; Vitale & Cull, 2020). In addition, any necessary documentation pertaining to institutional legal obligations should be fulfilled.

IT elements of the clinic, for example, a website, online client application, tax clinic email address, phone number, central repository for documents and its taxonomy, SMS messaging, cyber-security etc. should be in place. Operating procedures should have been discussed and decided on, for example: client records, student induction, training and supervision, controls and standards of operation (Freudenberg et al., 2020).

Once the staffing organigram has been decided, the appointment of key staff should take place and the student recruitment process (see Students) should be carried out so that there are sufficient students appointed and trained.

The success of clinics has been closely linked to their promotion and marketing. The number of bookings were directly linked to promotion of the clinic (Le & Hoyer, 2020; Raines & Walpola, 2020). It is suggested that this should be done in anticipation for the opening of the clinic and not only once it is operating (Abeysekera, 2020; Freudenberg et al., 2020). Therefore, a foundational task will be the development and distribution of marketing material (Freudenberg et al., 2020).

Other than the foundational decisions that need to be made before the clinic opens, day-to-day administrative decisions also need to be ascertained so that these aspects of the clinic are clarified and ready to be applied for the clinic to work effectively.

Day-to-Day Administrative Decisions These encompass decisions that are not part of the foundational decisions already discussed and include: staff duties, appointments with clients, supervision of students and external stakeholders. These are considered next.

Staff Duties Students need to be assigned duties and rostered to operating hours. Assignment of students will need to account for allocation of students to particular days (cognisance needs to be taken of supervision capacity and class schedules) (Freudenberg et al., 2020). Supervisors will also need to be assigned.

Appointments with Clients Most clinics operated on an appointment basis (Blanthorne & Westin, 2016; Blaxell, 2014; Jogarajan et al., 2020; McLaren, 2020; Raines & Walpola, 2020), although some did allow for walk-in assistance (Blanthorne & Westin, 2016). The founder will need to decide how clients will be serviced in this regard. Some clinics considered an application form that was assessed for eligibility (students can carry out assessment and contact client for any clarifications). While other clinics permitted clients to self-assess their eligibility and make appointments directly.

Supervision of Students The analysis showed that the clinics were set- up for students to provide the services to clients under various supervision strategies. These strategies were meant to encourage confidence in the students' abilities whilst protecting the clients (Allen et al., 2012). The strategies could be grouped into two groups, being "upskilling the student" and "supervision".

Some clinics commenced with the orientation of students on the running of the clinic with the intention of upskilling the students (Blaxell, 2014). In other cases, policy and procedure manuals detailing student tasks and, initial client meeting instructions, were designed to support students in developing necessary skills to effectively participate in the clinic. In instances where telephonic conversations had to be held between the students and clients, written statements were placed near the telephones for use as prompts in cases of students not being sure of their response (Allen et al., 2012). One clinic went as far as compiling a question and answer booklet to ensure consistency in the answers provided by the students in their interaction with clients (Raines & Walpola, 2020). The literature reviewed suggests a correlation between student upskilling and the level of supervision offered.

Clinical supervision requires that work be partially delegated to the student for purposes of learning (Giddings, 2008). Supervision in some of the clinics reviewed took the form of group meetings where students shared and reflected on each other's clinical experiences (Ryan, 2020). The group meetings platform was also used to provide students with additional guidance in relation to various other skills including dress code, professional conduct, office policies, as well as other issues that arose (Allen et al., 2012). Many of the clinics employed academic or experienced and registered practitioners as supervisors on a one-on-one basis with the students (Jogarajan et al., 2020; Kotonya, 2022; Le & Hoyer, 2020). It was evident that each clinic's purpose (largely educational or to benefit the community) influenced the type of supervision that was chosen (Blaxell, 2014; Ryan, 2020) as well the extent of supervision necessary (Freudenberg et al., 2020; Kotonya, 2022; Vitale & Cull, 2020). Registered tax practitioners were often sourced using pro bono support from local tax practitioners (Le & Hoyer, 2020).

5.3.7 External Stakeholders

Experience shows that it takes dedicated stakeholders (external to the faculty) to pilot a clinical programme (Rosenbaum, 2016). The community, government and professionals associated with the relevant professions are among the main external stakeholders. Over and above these external stakeholders, new clinics also reported that collaborations with well-established clinics were beneficial. Allen et al. (2012) maintained that support from established clinics is not necessary for a clinics' successful piloting, however, forming partnerships with established clinics could be beneficial for emerging clinics (Rosenbaum, 2016). Taking this into consideration, it could be argued that the determination of pertinent external stakeholders ultimately rests upon the objectives and strategic aims of the clinic and its founding university.

6 Limitations and Future Research

As a scoping review is dependent on information found to answer the research question, overlooking relevant sources of information is a limitation (Pham et al., 2014). More especially for the review carried out in this paper as an *a priori* decision was made to search for specific terms. This paper reviewed a limited number of citations. To remedy this in part, a transparent and robust review process was used to strengthen the review carried out. The risk aspect was not addressed in this paper and will form part of future research. Further research is recommended in terms of a risk-benefit analysis of clinical education. The educational implications of setting up a tax clinic and the best practices in this regard should also be researched further, so that a tax clinic is of the benefit to both students and the community. Lastly it is suggested that future research could also consider financial sustainability of such ventures.

7 Conclusion

The aim of this scoping review was to identify and consider the decision variables involved in initiating the design of a clinical education programme at a university, using the experiences of clinics that have been reported in prior literature. Scoping reviews identify the breadth of evidence available on a specific topic (Munn et al., 2022). Scoping reviews are exploratory in nature and map the landscape rather than focus on what is effective (Munn et al., 2022). Examining the literature yielded three overarching categories of decision variables associated with the design of such an initiative, namely: (i) institutional decisions; (ii) target audience; and (iii) operational considerations. Decisions made in this respect were found to be substantially influenced by the clinic's specific purpose and objectives. Initiating decisions were also found to include inter-relationships with other decision variables, affirming a holistic framework when considering designing a tax clinic.

The review of reported clinical education initiatives indicate that the initial decision variable is one of deciding the purpose of the initiative. It is recommended that academics considering initiating such a project consider whether the clinic is for cultivating graduate qualities in students, educating the community, social justice or other reasons, as this scoping review shows, that the purpose of the initiative will have implications on all other decision variables.

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Section 24 Amendment Introduces Additional Uncertainty in Interpretation, Enforcement and Tax Compliance

Muneer Hassan and Michelle Van Heerden

Abstract Trading stock sold under a contract requiring full or partial payment for ownership to transfer falls under section 24. Section 24 taxes the full amount upfront and grants the taxpayer a debtors' allowance deduction, resulting in a cash flow basis of taxation. Section 24 was amended to specify that the relief also applies to lay-by agreements. The application of section 24 to lay-by agreements is ambiguous, resulting in multiple interpretations, which posed the research problem. This paper presents three distinct interpretations of lay-by agreements and the application of section 24. A qualitative research methodology and a doctrinal research method were applied. Through a review and analysis of practical, simulated examples, this paper illustrates the three interpretations. The first opinion is that lay-by agreements are scoped into section 24 and relief is applied, which has the effect of taxing deposits received on a cash flow basis at the gross profit percentage. The second interpretation also scopes in lay-by agreements, but applies the full amount taxed as gross income as the relief, resulting in no impact on the taxpayer's taxable income. This interpretation yields the same result as the third interpretation, which is that lay-by agreements do not fall within the scope of section 24 because, until the goods are delivered, deposits do not constitute receipts for the supplier. The paper concludes with recommendations for the National Treasury to clarify the ambiguity through additional legislative amendments in support of the third interpretation based on sound arguments presented, namely court case principles and views of commentators, to provide taxpayers with certainty.

Keywords Lay-by · Section 24 · Debtors' allowance · Deposit · Trading stock

1 Introduction

The context and background to the research problem is presented in this section.

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1.1 Background

In accordance with section 24(1) of the Income Tax Act (No. 58 of 1962), the full amount under sale agreement is subject to immediate taxation when a taxpayer sells trading stock under a suspensive sale condition where the transfer of ownership of movable property or immovable property will occur at a later stage following the receipt of a portion of the full amount or the full amount due (South African Government, 1962).

Section 24(2) then provides relief in the form of a debtors' allowance to the taxpayer in response to the problem it has created. The relief only applies to contracts that are at least one year long and under which at least 25% of the amount owed to the taxpayer is payable only in a subsequent year of assessment. The relief granted must be added back to income in the subsequent assessment year. The objective of section 24 is to tax the taxpayer using the cash flow method rather than the accrual method (National Treasury, 2023a). The allowance will only be deductible if the Commissioner deems it to be reasonable.

South African consumers have long utilised lay-by agreements to acquire household items, school uniforms and office supplies for their dependants (National Treasury, 2023a). Lay-by arrangements are sale arrangements that allow consumers to purchase and pay for goods over a period, typically three to six months, without incurring interest charges. Lay-by arrangements are a form of savings, because they allow a larger population to acquire goods outside of instalment sale credit arrangements, thereby reducing the level of debt. Due to the impact of the Covid-19 pandemic on household incomes and the current economic climate, the majority of consumers now purchase school uniforms and supplies on lay-by.

However, lay-by agreements do not qualify for relief under section 24, because their duration is typically less than 12 months (i.e. lay-by agreements typically last between three and six months) (National Treasury, 2023a). The complete inclusion in gross income without any relief has negative tax consequences. It is anticipated that these effects will increase as more consumers choose lay-by purchases due to financial constraints (National Treasury, 2023a).

To mitigate these adverse tax effects, section 24(2) has been inserted. Consequently, the relief now applies to lay-by transactions of less than 12 months (National Treasury, 2023b). The amendments became effective on 1 January 2023 and will apply to assessment years ending on or after that date.

According to Louw (2022, n.p.), commenting on the budget proposals to extend the relief under section 24(2) to lay-by agreements "section 24(1) is not necessarily applicable to lay-by arrangements. As such, there should be no concern in relation to the debtors allowance". Therefore, there are different views as to whether section 24(1) of the Income Tax Act scopes in lay-by agreements. This led to the research problem of this study.

1.2 Problem and Rationale for the Study

Even though section 24(2) of the Income Tax Act has been amended to specify that section 24 relief is applicable to lay-by agreements, there are differing opinions regarding whether section 24(1) applies to lay-by agreements. The research question was, does section 24(1) apply to lay-by agreements? This was the research focus of this study.

According to Adam Smith (1994), an economist and pioneer in the early 1700s, a good tax system should encompass four pillars, namely fairness, certainty, convenience and efficiency. Certainty means:

> [t]he tax which each individual is bound to pay ought to be certain, and not arbitrary. The time of payment, the manner of payment, the quantity to be paid, ought all to be clear and plain to the contributor, and to every other person. (Smith, 1776, as cited by Adam Smith Institute, n.d., n.p.)

Therefore, the law should be certain and should not contain any ambiguity.

1.3 Research Objective

The purpose of this study was to examine the various interpretations of whether lay-by agreements fall under section 24(1) and the implications of each interpretation. The objective of the study raised the following sub-questions in order answer the main research question:

1. What is the scope of section 24 and what are its implications?
2. What are the various interpretations regarding whether lay-by agreements fall under subsection 24(1) of the Income Tax Act?
3. What are the consequences, i.e. the tax effects, of these diverse interpretations?

The study focused solely on the income tax implications of lay-by agreements. Other implications, such as value-added tax (VAT), were not considered in this study.

1.4 Contribution of This Study

This study contributes to the tax field through an analysis of the various interpretations of whether lay-by agreements fall within the scope of section 24(1) and recommends that the National Treasury make legislative changes to provide legislative clarity (certainty). The research methodology and research method utilised in this study are described next.

2 Research Methodology

The interpretive paradigm was appropriate, because this research required the interpretation of legislation, case law and other writings, along with the qualitative research methodology (see Plano Clark & Creswell, 2008), which is useful for comprehending and describing data (Babbie & Mouton, 2009), such as the documentary data used in taxation research. According to McKerchar (2010, p. 15) research may reflect "either positivism or non-positivitism", its methodological approaches basically comprise either doctrinal research, or non-doctrinal research. Doctrinal research as a methodology is commonly applied in the field of taxation (Frecknall-Hughes, 2016; see Young, 2021). Doctrinal research necessitates research involving secondary sources and commentary to determine "what is known and what is not known" about the research topic, thereby incorporating a literature review (Hutchinson & Duncan, 2012, p.113). This study employed a doctrinal research methodology (McKerchar, 2008), which provides a systematic exposition of the rules governing a particular legal category, in this case the legal rules pertaining to section 24 of the Income Tax Act, as well as the interpretation notes of the South African Revenue Service (SARS), textbooks, articles and the writings of experts in the field. The study ensured validity and reliability by providing a sound argumentative foundation for its conclusions.

This study made use of a number of data sources in conducting the literature review. Using search engines such as Google Scholar and the University of Johannesburg's (UJ) databases, i.e. UJ Google (UJ database online search engine), online searches were conducted to gather information and documents. The websites of the following institutions were also searched: professional accountancy firms; government, such as SARS and the National Treasury; and international organisations, such as the Australian Tax Office. The search terms used included, but were not limited to, lay-by, section 24, debtors' allowance, deposit, trading stock. The next section provides the scope and implication of section 24.

3 Section 24: Scope and Implication

3.1 The Law

In terms of section 24 of the Income Tax Act:

24. Credit agreements and debtor's allowance

(1) *Subject to* the provisions of section *24J*, if any *taxpayer* has *entered into* any *agreement* with any other person in respect of any property the effect of which is that, in the case of *movable property*, the *ownership shall pass* or, in the case of *immovable property, transfer shall be passed* from the taxpayer *to that other person, upon or after* the *receipt by the taxpayer* of the *whole* or a certain *portion* of the *amount* payable to the taxpayer under the agreement, the *whole* of that

amount shall for the purposes of this Act be *deemed* to have *accrued* to the taxpayer *on the day on which the agreement was entered into.*

(2) In the case of such an agreement in terms of which *at least 25 per cent* of the said *amount payable* only *becomes due and payable on or after* the expiry of a period of *not less than 12 months* after the *date* of the said *agreement*, the Commissioner, *taking into consideration* any *allowance* he has made under section *11(j)*, may make such *further allowance* as under the special circumstances of the trade of the taxpayer seems to him reasonable, in respect of *all amounts* which are *deemed to have accrued* under such agreements but which have *not* been *received at the close of the taxpayer's accounting period: Provided* that any *allowance so made shall be included* as *income* in the taxpayer's returns *for the following year of assessment* and shall form part of his income.

(2A) In the case of a *lay-by agreement* as contemplated in section 62 of the Consumer Protection Act, 2008 (Act No. 68 of 2008), the *Commissioner may make an allowance* in respect of *all amounts* which are *deemed to have accrued* under such agreement but which have *not* been *received by the end of the taxpayer's year of assessment.*

(2B) Any *allowance* made *under* subsection *(2A)* shall be *included in the income* of that taxpayer in the immediately *following year of assessment*. (emphasis added)

3.2 Explanation of the Law

3.2.1 Scope

Certain credit agreements provide that ownership of the goods sold will pass to the purchaser only when a certain part or the entire price has been paid. Section 24 is applicable to agreements in respect of property that are both movable and immovable, where ownership passes to another person after receipt of the whole amount or a portion of the amount as per the agreement, in which case the taxpayer is deemed to have received the full amount of the agreement on the date on which the agreement was entered into.

According to SARS (2018, p. 2), section 24 only applies to the disposal by a taxpayer of trading stock under an instalment credit agreement. The scope also includes non-application, i.e. when the section will not apply. According to SARS (2018), the section 24 debtors' allowance does not apply to sales on extended credit terms, sales subject to resolutive condition or finance leases. Further, according to SARS (2018), section 24 applies to lay-by agreements of not less than 12 months. Therefore, the view of SARS is that section 24 scopes in lay-by agreements if the agreement is not less than 12 months, i.e. in relation to lay-by agreements that are 12 months or more.

3.2.2 Implication

Section 24 deems the whole of the amount excluding finance costs to have accrued to the taxpayer on the day the agreement was entered into. It also provides relief for taxpayers, taking into account the doubtful debt allowance under section 11(j), in respect of a further debtors' allowance. The relief only applies to contracts that are at least one year long and under which at least 25% of the amount owed to the taxpayer is payable only in a subsequent year of assessment, but this requirement does not apply in relation to lay-by agreements. Finance charges and VAT must be excluded from turnover (sales) and cost of sales in determining the gross profit percentage, which is calculated as follows (SARS, 2018, p. 7):

$$[(\text{sales–cost of sales})/\text{sales}] \times 100$$
$$= \text{gross profit percentage; or } (\text{gross profit}/\text{sales}) \times 100 = \text{gross profit percentage}$$

Thus, the section 24 allowance = gross profit % × outstanding debtors (after adjusting for bad debts (section 11(i)) and the provision for doubtful debts (section 11(j)). The section 24 allowance granted in any year can also be used to create an assessed loss or to increase an assessed loss (SARS, 2018).

In relation to lay-by agreements and section 24 of the Income Tax Act, three distinct interpretations are possible.

1. The scope of section 24(1) includes lay-by agreements and the gross profit percentage must be applied as the relief under section 24(2).
2. Lay-by agreements fall within the scope of section 24(1) and the full amount included in gross income must be applied as the relief under section 24(2).
3. Lay-by agreements are not within the scope of section 24(1).

These interpretations are discussed and analysed next.

4 Interpretations

The three possible interpretations in relation to lay-by agreements and section are analysed in this section. The first interpretation is that held by the National Treasury, i.e. lay-by agreements fall within the scope of section 24(1) and gross profit is applied as relief.

4.1 The Scope of Section 24(1) Includes Lay-by Agreements, and the Gross Profit Percentage Must Be Applied as the Relief Under Section 24(2)

According to SARS (2018, p. 3):

> *Section 24 also applies to lay-by agreements of not less than 12 months*. Under a lay-by the buyer pays the purchase price over a period while the seller retains possession of the goods until the purchase price is paid in full. Ownership passes to the buyer on the date on which the purchase price is paid in full and the goods are delivered to the buyer. (emphasis added)

Therefore, the view of SARS is that section 24 scopes in lay-by agreements, but only if the agreement is not less than 12 months, i.e. the agreement is 12 months or more.

According to SARS (2021, n.p.), "Interpretation Notes are intended to provide guidelines to stakeholders (both internal and external) on the interpretation and application of the provisions of the legislation administered by the Commissioner". Section 1 of the Tax Administration Act (No. 28 of 2011) defines 'official publication' as specifically including an interpretation note (Republic of South Africa, 2011). A 'practice generally prevailing' is "a practice set out in an official publication regarding the application or interpretation of a tax Act" (section 1 of the Tax Administration Act read in conjunction with section 5(1) of the Act). When SARS issues a tax assessment in accordance with prevailing practice for example an interpretation note, it cannot assess the taxpayer differently in the future. Moreover, if no assessment is issued by SARS and taxpayers calculated their tax liability according to the generally accepted practice, SARS cannot assess the taxpayer differently (Mazansky & Fyfe, 2019). Taxpayers may use an interpretation note as guidance, but they may also disagree with its contents and are in no way bound by them (Mazansky & Fyfe, 2019). However, SARS is bound by the content until it withdraws the interpretation note. The Constitutional Court confirmed in *Marshall NO v Commissioner for the* South African Revenue Service (2018) CCT 208/17, ZACC 11 that courts should generally disregard interpretation notes or guides (Le Roux & Mia, 2020). Nonetheless, it implicitly acknowledged that in any question of statutory interpretation involving a close call, a court may consider an interpretation set forth in an interpretation note if there is evidence that SARS and taxpayers have followed the interpretation for a number of years.

According to the National Treasury (2023a, p. 18):

> At issue is that the current provisions of section 24 of the Act do not extend to cover the abovementioned South African scenario of a lay-by agreement. Accordingly, a seller under a layby arrangement is subject to the provisions of section 24(1) of the Act and is required to recognise an upfront inclusion of the sale price in full. However, due to the fact that lay-by arrangements generally last for periods much shorter than 12 months (typically between three to six months), the seller will not benefit from the debtors' allowance contained in section 24(2) of the Act. The upfront inclusion of lay-by proceeds without any allowable deduction creates an adverse tax result, which is expected to increase as more consumers are choosing to enter into lay-by arrangements due to financial constraints.

Table 1 Tax effect on taxable income

Tax position at year end in respect of lay-by agreements	R
Deemed accrual of sales proceeds, per section 24(1) of the Income Tax Act	1 000000
Section 24 allowance (R900 000 × 20%)	(180000)
Purchases, section 11(a) deduction (R1 000000 × 80%)	(800000)
Effect on taxable income of Company E is an increase of	20,000

Therefore, according to the National Treasury, section 24(1) encompasses all lay-by agreements, regardless of their duration. The view of the National Treasury is much broader than that of SARS in Interpretation Note 48.

The main difference following the amendment according to the National Treasury is that a taxpayer will qualify for the relief even though at least 25% of the amount payable under the agreement is not due and payable at least 12 months after the date of the agreement. According to Stiglingh et al. (2023), taxpayers can therefore qualify for the temporary income tax relief. This ensures that they are taxed on the cash flow basis.

Following the interpretation by the National Treasury outlined above, in order to display the tax effect on taxable income of a taxpayer, the authors of this paper provide the following simulated example:

Facts: Assume a taxpayer enters into lay-by sale agreements for R1 000000 before the end of the year and receives a 10% lay-by deposit. Further, assume that the taxpayer's gross profit is 20%. Table 1 demonstrates the tax impact on the taxpayer's taxable income.

The net effect on the taxpayer's taxable income is R20 000, i.e. the taxpayer is being taxed on the cash flow basis at the gross profit percentage (R100 000 × 20% = R20 000).

A further interpretation is that lay-by agreements fall within the scope of section 24(1) and the full amount included in gross income must be applied as the relief under section 24(2). Therefore, the implication for the taxpayer is R0. This interpretation is discussed and analysed next.

4.2 *Lay-by Agreements Fall Within the Scope of Section 24(1), and the Full Amount Included in Gross Income Must Be Applied as the Relief Under Section 24(2)*

Under this interpretation, the amount received under the lay-by agreement is included in gross income and the full inclusion is then applied as the relief allowance. Haupt (2023, p. 173) explains the tax implications under the SARS interpretation by providing the following example:

Example—Lay-by sales

Company E has a 30 November year end. Most of its sales of consumer goods are made in December of each year. For its year of assessment ended 30 November 2022 it had received R2 million in respect of payments under lay-by agreements, for goods to be delivered to customers when the final payment under each agreement is made by each relevant customer in December 2022. As at 30 November 2023, Company E has received R3 million in respect of payment under lay-by agreements, for goods to be delivered to customers when the final payment under each agreement is made by the relevant customer in December 2023.

Company E makes a profit of 20% of the selling price of all of its goods. Calculate the effect of the above on Company E's taxable income (ignore VAT).

Tax position at 30 November 2022 in respect of lay- by agreements:*	
Deemed accrual of sales proceeds, per section 24(1) of the Income Tax Act	R2 000000
Section 24C allowance (R2 000000 x 80%)	(1600000)
Effect on taxable income of Company E is an increase of	R400 000

*The amendment only applies for years of assessment ending on or after 1 January 2023

Tax position at 30 November 2023 in respect of lay-by agreements:

Deemed accrual of sales proceeds, per section 24(1) of the Income Tax Act	R3 000000
Section 24(2A) allowance (R3 000000 x 100%)	(3 000000)
Effect on taxable income of Company E is an increase of	nil

The amount actually received by Company X under the lay-by agreements is not relevant, because these are not beneficial receipts for income tax purposes, due to the provisions of section 62 of the Consumer Protection Act, which creates 'some form of statutory trust' in respect of those receipts

It is interesting to note that Haupt applies section 24C, future expenditure allowance, prior to the addition of section 24(2A), which deals specifically with lay-by agreements. In addition, how is the 100% deduction under section 24-(2A) justified? Since SARS Interpretation Note 48 bases the allowance on the gross profit percentage.

This interpretation has the same impact on taxable income as the interpretation presented in Sect. 4.3 discussed below, which evaluates the interpretation that lay-by agreements are not scoped into section 24(1).

4.3 Lay-by Agreements Are Not Within the Scope of Section 24(1)

Section 24(2A) refers to a lay-by agreement as contemplated in section 62 of the Consumer Protection Act, 2008 (Act No. 68 of 2008) (CPA). Section 62 of the reads as follows (Republic of South Africa, 2008):

Lay-bys

62. (1) If a supplier agrees to sell particular goods to a consumer, to accept payment for those goods in periodic instalments, and to hold those goods until the consumer has paid the full price for the goods—

(a) *each amount paid by the consumer to the supplier remains the property of the consumer*, and is subject to section 65, until the goods have been delivered to the consumer; and

(b) the particular *goods remain at the risk of the supplier until the goods have been delivered* to the consumer. (emphasis added)

According to Haupt (2023, p. 172), "[i]t is clear that even though the supplier has received cash, such cash does not belong to the supplier. Effectively, in law, it is holding the cash in trust and the cash is, therefore, not a receipt in the income tax sense".

Haupt (2023) goes on to explain that this legal principle was reconfirmed in ITC 24510, 2019, *SATC*. The case dealt with whether revenue from the sale of gift cards constitutes gross income. Even though the case involved the sale of gift cards, which are governed by section 63 of the CPA, the underlying principle is identical to that of section 62. It was determined that the payment received for the sale of gift cards was not gross income, because the seller did not receive the payment for its own benefit until the gift cards were redeemed. Binns-Ward (ITC 24510, 2019*,* *SATC*, pp. 16–17), in response to SARS's argument, stated as follows:

> [38] *The effect of the legislation is the creation of some form of statutory trust*, even if it might not conform in all respects with the trust forms recognised in our common law. *The taxpayer is placed* by virtue of the statute's prescripts *under a fiduciary duty to the bearer of the card to ensure that the funds are kept available until the prepayment is redeemed . . .*
>
> [43] The pertinent provisions of *the CPA create a legal construct* that results in *the taxpayer initially taking the gift cards receipts not for itself, but for the card bearers. The effect* of the resultant cognisable legal context as a factor bearing on the determination whether the receipts are taken for the taxpayer or for someone else, is, in principle, *no different from that of the fideicommissum* in Holley, *the usufruct* in Geldenhuys, *the cession of shares* in Smant, *or the memorandum and articles of association* in Cape Consumers. (emphasis added)

According to Haupt (2023, p. 166), "[k]eeping this in mind, until the goods are delivered, the amounts paid under the lay-by agreement do not constitute (beneficial) receipts of the supplier, even if the funds are intermingled with the supplier's other cash takings". Haupt's view is also supported by Louw (2022).

There are two issues that must be valuated when considering lay-by sales, namely the deposit received and the accrual of the outstanding debtors' amount.

4.3.1 Deposit Received

In Geldenhuys v CIR (1974) *(3) SA 256 (C); 14 SATC 419* it was held that the words "received by . . . the taxpayer" in the definition of gross income means 'received by the taxpayer on his own behalf for his own benefit'. Lay-by sales deposits are not gross income, because taxpayers do not receive them for their own benefit.

4.3.2 Accrual of the Outstanding Debtors' Amount

In Mooi v SIR, 1972 *(1) SA 674, 34 SATC 1* it was held that 'accrued to' means unconditionally entitled to the amount. As the goods are still in the seller's possession, the taxpayer is not unconditionally entitled to the outstanding lay-by amount. Therefore, the amount of outstanding debtors does not accrue to the taxpayer. Hence, if this interpretation is applied, lay-by agreements do not fall within the scope of section 24(1).

4.3.3 Example

The interpretation in this section is applied to the following simulated example, in order to display the tax effect on taxable income of a taxpayer:

Facts: Assume a taxpayer enters into lay-by sale agreements for R1 000000 before the end of the year and receives a 10% lay-by deposit. Further, assume that the taxpayer's gross profit is 20%. Table 2 demonstrates the tax impact on the taxpayer's taxable income.

The next section evaluates the tax implication of lay-by transactions by an international tax jurisdiction.

5 International Comparison

The Australian Tax Office issued a ruling (TR 95/7) titled "Income tax: lay-by sales" In accordance with the decision (Australian Tax Office, 1995: page 4):

> When are amounts received under a lay-by sale earned?
>
> 6. With one exception, *amounts received* (e.g., initial deposit and instalments) by the seller from the buyer while goods are held by the seller *under a lay-by sale are not earned by the seller, and therefore are not derived for the purposes of subsection 25(1) of the ITAA [Australian Income Tax Act]*, until the buyer pays the final instalment of the purchase price, and the goods are delivered to the buyer.

Table 2 Tax effect on taxable income

Tax position at year end in respect of lay-by agreements	R
Deemed accrual of sales proceeds, per section 24(1) of the Income Tax Act	0
Section 24 allowance	0
Purchases, section 11(a) deduction	0
Effect on taxable income of Company E	0

> 7. *The exception is any initial deposit which*, by the terms or conditions of the lay-by sale, *is a non-refundable deposit that a buyer is required to pay to a seller.* A non-refundable deposit is earned and is derived by the seller when it is due to be paid by the buyer. (emphasis added).

Consequently, it is evident that the Australian Tax Office does not tax amounts received or owed as a result of a lay-by sale under the Australian Income Tax Act. The only exception to this rule is for deposits that are non-refundable.

The following section provides a summary of the tax impact of the various interpretations.

6 Analysis

Table 3 provides an analysis of the tax impact of the application of the various tax implications on lay-by sales and section 24 of the Income Tax Act.

Based on the preceding analysis, it is clear that, depending on the interpretation chosen, the effect on taxable income is either nil or the income received is taxed at the gross profit percentage, i.e. taxed on a cash flow basis. Therefore, the interpretation has a substantial effect on taxpayers' taxable income.

Regarding the first interpretation, i.e. lay-by agreements fall within the scope of section 24(1) and relief is applied under sections 24(2A) and (2B), the interpretation provided by SARS in Interpretation Note 48 does not align with the National Treasury's interpretation and the amended law, and SARS has not retracted its interpretation. The deemed inclusion of the entire amount under section 24 for sales of trading stock can be interpreted as an anti-avoidance measure, but the same concerns do not apply to lay-by sales. When section 24 applies to the sale of trading stock on credit, the trading stock has already been received by the purchaser; the sale has a subjective clause. This is not comparable to lay-by agreements, as the buyer has not yet received the trading stock in lay-by agreements. Therefore, the same rules and policy concerns cannot apply.

The authors of the paper respectfully disagree with the second interpretation, i.e. deemed inclusion of the full amount in terms of the agreement in gross income

Table 3 Summary of the tax impact: Application of the various tax interpretations

Interpretation	Net effect on taxable income
1. The scope of section 24(1) includes lay-by agreements and the gross profit percentage must be applied as the relief under section 24(2).	Taxed on a cash flow basis, i.e. the amount received is taxed at the gross profit percentage
2. Lay-by agreements fall within the scope of section 24(1) and the full amount included in gross income must be applied as the relief under section 24(2).	R0
3. Lay-by agreements are not within the scope of section 24(1).	R0

and full relief applied equal to the deemed amount included, as section 24-(2B) requires that the relief be added back to the taxpayer's income in the following year of assessment, indicating that this is a temporary relief designed to tax the taxpayer on a cash flow basis, which is the effect of the section.

The authors of this paper support the third interpretation, i.e. that lay-by agreements do not fall within the scope of section 24(1) on the following basis of arguments presented:

1. The CPA expressly states that the consumer retains ownership of the amount received.
2. *ITC 24510* upheld and confirmed the legal principle contained in the CPA.
3. Authors in the field of taxation support this interpretation (Haupt, 2023; Louw, 2022).
4. The lay-by deposit is not received in accordance with the court case principle in *Geldenhuys v CIR*, and the amount outstanding is not accrued in accordance with the court case principle in *Mooi v SIR*.
5. This interpretation further holds support applied by an international tax jurisdiction i.e. the Australian Tax Office.

7 Conclusion

Section 24 applies when trading stock (i.e. movable or immovable property) is sold pursuant to an agreement, where ownership is transferred or transfer passes after the payment of a portion or the entire amount. The implication is that the entire amount must be included in gross income and the taxpayer is entitled to relief under the section, which has the effect of taxing cash flow-based receipts at the gross profit percentage, if at least 25% of the total amount is due and payable at least 12 months after conclusion of the agreement; however, this requirement does not apply to lay-by agreements.

This study utilised a qualitative, doctrinal research methodology and a conventional literature review as its research method. A limitation of doctrinal research is the availability and selection of appropriate and trustworthy sources (Dahiya, 2021). Similarly logical deduction is difficult. Even if the reviews are conducted by subject matter experts, they may be influenced by preconceived notions or conclusions (Demeyin, 2016). In this regard, the authors of the paper relied on trusted sources and conducted the literature review, analysed it by presenting tax interpretations, and drew conclusions based on the soundness of the arguments presented.

There have been legislative changes made to section 24 to expressly permit the section 24 relief to also apply to lay-by agreements, in these instances the requirement. Nonetheless, different interpretations have emerged. Does section 24(1) apply to lay-by agreements? This was the research question of this study.

The first interpretation is that lay-by sales fall within the scope of section 24 in accordance with SARS Interpretation Note 48, if the agreement is 12 months or more, and that the relief is therefore also available to the taxpayer. A SARS interpretation note is an official publication of SARS and as such a practice prevailing. Therefore, SARS is held by the contents of its interpretation notes, but taxpayers may use the interpretation notes as guidance, yet may also disagree and are not bound by it. This principle was supported in Marshall NO and Others v Commissioner for SARS (2018). The National Treasury takes an even wider interpretation than SARS and scopes into section 24 all lay-by agreement without regard to the period of the agreement. Accordingly, the amendment provides the taxpayer with the relief under section 24, despite the fact that the statutory requirement that at least 25% of the total amount be due and payable 12 months or more after termination of the agreement is not met, as this requirement is scoped out by the legislative amendment. If this interpretation is applied, the taxpayer will be taxed on a cash flow basis using a percentage of gross profit. The authors of this paper argue that with lay-by sales, the concerns associated with the sale of trading stock on credit where ownership is transferred after payment of a portion or the entire amount, i.e. suspensive sales, do not arise. In a lay-by sale, the seller retains ownership of the goods.

Under the second interpretation, lay-by agreements are also read into the scope of section 24(1) and the full amount is deemed to be included in gross income; however, the relief granted to the taxpayer is equal to the deemed amount included in gross income. How is the 100% deduction allowed by section 24(2A) justified under this interpretation as the allowance is based on the gross profit percentage in SARS Interpretation Note 48? Consequently, there is no tax consequence for the taxpayer.

The third interpretation holds that lay-by agreements do not fall within the scope of section 24(1) because the CPA expressly states that the amount received remains the consumer's property. This interpretation was also upheld and confirmed in *ITC 24510*. This interpretation also has the support of tax specialists in the industry. The lay-by deposit and amount outstanding are not received or accrued according to the principles established in *Geldenhuys v CIR* and *Mooi v SIR*, respectively. Further, this interpretation also holds the support of an international tax jurisdiction i.e. the Australian Tax Office. Therefore, based on these arguments, lay-by sales do not fall within the scope of section 24(1), and it is unnecessary to further explore the relief considerations.

Given the divergent interpretations and effects on taxable income ranging from being taxed on a cash flow basis at the gross profit percentage to R0, legislative clarification is required. The authors of this paper support the third interpretation, namely that lay-by agreements do not fall within the ambit of section 24(1), on the grounds argued and presented. It is therefore necessary to amend the law to eliminate this ambiguity and provide certainty for taxpayers.

This study also recommends additional research to conduct an international analysis in relation to the research issue. Future research should also examine the accounting treatment of lay-by agreements from an interdisciplinary perspective.

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Does Off-board and On-board Gender Diversity Affect Financial Performance? Evidence from Deposit Money Banks in Nigeria

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Abstract Corporate failures have been attributed to the board of directors. Gender diversity of the on-board and off-board directors in the firm could be a remedy for such failures. Studies have focused on gender diversity in boardrooms with few studies on the complementary effect of both on-board members and off-board members. The study, therefore, examined the effect of gender diversity of board members and non-board members on the financial performance of the Deposit Money Banks (DMBs) in Nigeria. The population for this study comprised twenty-four listed DMBs. Purposive sampling was used in this study for selecting 11 Deposit Money Banks whose stocks were actively traded on the stock market during the sample period and for which pertinent data were readily available. The study employed secondary data, sourced from the annual reports of eleven DMBs from 2010 to 2021. The gender diversity composite score was generated using a Principal Component Analysis of the proxies for gender diversity using a Varimax Rotation. While the model was estimated using the panel GLS model which is robust to the residual misnomer. The findings revealed that Female CEOs, Female Executives, Female Non-Executives, and Firm Size had a positive and significant relationship with financial performance while Female employees, Female Audit Committees, Board meetings, leverage and Inflation revealed a negative and significant relationship with financial performance. Specifically, the study concluded that gender diversity maintained a positive and significant relationship with Return on Assets. Our findings imply that board gender diversity may promote the strength of corporate governance and reduce the likelihood of agency conflicts, enhancing performance.

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1 Introduction

A critical issue in corporate governance is the lack of gender diversity on corporate boards (Ahmed et al., 2017). Increasing gender diversity in top executive positions and the boardroom has become a major concern for regulatory bodies, notably in Nigeria. The management of an organization is allegedly the responsibility of the board of directors. The management of the company's operations in the interests of its shareholders and the company as a whole is one of the board of directors' main responsibilities. There is mounting evidence in academic and business literature that when management boards and teams are generally more diverse, including gender, businesses see significant improvements (Offermann & Foley, 2020; Schopohl et al., 2021). The board of directors, a crucial component of any company, is in charge of steering the firm's direction and defending the shareholder's interests (Abdullah, 2004). In contrast, boards of directors have come under fire for failing businesses and a decrease in shareholder value (Abidin et al., 2009). Several of the explanations given for company failures include lack of control by the managers that are pursuing their self-interests, ineffective monitoring by the board, and the board's lack of accountability to shareholders (Abidin et al., 2009) and diverse board.

The board's diversity has been described in several different ways. Components including gender, age, country, ethnicity, educational background, and membership in the organization could be used to define board diversity (Campbell & Mínguez-Vera, 2008). Gender diversity is regarded as an organisation's fair representation of individuals of diverse genders and a proportionately equal number of women and men. Gender diversity and having a female on the board could improve the effectiveness of the company. Thus, more liquidity and lesser debt may be features of female-led businesses, and these indicators are critical for assessing financial health. (Hedija & Němec, 2021). Additionally, it may be a crucial factor for prospective investors (Smith et al., 2021). Literature asserts that gender diversity may send signals to investors and other external stakeholders that affect how they assess a company's value (Dobbin & Jung, 2011; Smith et al., 2021) and also greater corporate social responsibility. The argument for more female board representation often hinges on four criteria, according to Doldor et al. (2012): enhancing performance, gaining access to a larger pool of talent, greater responsiveness to the market, and strengthening corporate governance. Women are believed to also help improve stock price informativeness (Gul et al., 2011) and lower operational costs (Chakrabarty & Bass, 2014). On the other side, we should also emphasize that there is a chance that diversity could result in lower company performance if decision-making takes longer as a result of diversity. In that situation, the board's heterogeneity may result in conflict and divergent goals, which would reduce the effectiveness of decision-making. Particularly, diversity may be linked to value destruction rather than value creation for businesses engaged in sectors that need rapid responses to market shocks (Smith et al., 2006). Therefore, it appears that gender diversity may have a double-edged effect, benefiting some businesses' performance while detrimental to others.

Legally enforceable quotas for women on corporate boards have been implemented in several European Union nations (Germany: 30 percent, Belgium, Italy, Greece: 33 percent, Austria: 35 percent, France: 40 percent) others have enacted laws requiring corporate governance or made suggestions to promote equality (Desvaux et al., 2017). In Norway, the percentage of women on the board must be at least 40% (Carter et al., 2010; De Cabo et al., 2019). Globally, there has been growing discussion regarding legislation requiring women to serve on boards, Nigeria includes; some nations that have not yet set a minimum standard for the anticipated percentage of women on company boards. Although the Board in Nigeria is given the duty of ensuring that the Board and its committees effectively carry out their duties without jeopardizing competence, integrity and independence, this duty is ensured by an appropriate balance of diversity and skills (which includes gender and experience).

The Nigerian banking sector has had recurring financial crises over the past two decades. In response, the sector has undergone several reforms, the most recent of which was the recapitalization and consolidation reform, which was implemented in 2004 and also reform on the need to address the global financial crisis (2010–2012). The crisis among many other things is due to weak corporate governance mechanisms (Ogundele et al., 2022). Corporate governance has been found to affect firms' financial performance. Banks have unique characteristics that make them complex commercial organizations and necessitate rigorous supervision. Banks are unique economic institutions that play an essential role in financial intermediation, liquidity, information, the payments system and maturity and denomination change (Fama, 1985). Also, banks play a vital role in the development of any economy. The health of the financial sector is crucial in any economy as its failure can disrupt the economic development and growth of the nation (Ogundele et al., 2020).

The bank's board is crucial in attaining effective governance due to its monitoring and advising roles. Diversity on the board, particularly in terms of gender diversity, has grown in relevance in terms of corporate governance in the banking sector, women play an even more significant role, particularly in promoting more responsible and sustainable management in the wake of previous bank failures, according to Birindelli et al. (2019). The benefits of gender diversity are increasingly being acknowledged as a way to improve corporate governance. The conversation regarding women directors has persisted due to the underrepresentation of women in boardrooms and the growing awareness of the potential benefits of gender-diverse boards. Issues in bank governance threaten the economy as a whole, other financial institutions, and the financial system as a whole.

Following multiple corporate scandals and financial crises, an important issue has arisen: would things have been different if more women had led firms in Nigeria and across the world? Corporate scandals like those at Enron, Tyco, WorldCom, and Parmalat have likewise heightened attention on the influence of gender diversity on the financial performance and value of the firm. Following these scandals, several practitioners have campaigned for increased board gender diversity. There is political campaigning in Nigeria for women to be allocated 35 percent of political posts (Nnabuife et al., 2015). The Nigerian Code of Corporate Governance 2011 are silent on the number of women to be nominated to company boards. The push to increase the number of women in Nigeria has created a demand for empirical research on gender diversity. Several studies, including a study by Credit Suisse Research Institute in 2016, analysed the gender diversity of boards across 3000 companies globally. They found that companies with a higher proportion of women on their boards tended to have higher returns on equity, higher valuations, and better stock performance. However, it is important to note that this study focused on companies globally and did not specifically examine Nigerian DMBs, and therefore this provides further insight into this area. Also, Studies (Gallego-Álvarez et al., 2010; Lückerath-Rovers, 2013; Hedija & Němec, 2021) have focused on the gender diversity of members in boardrooms with little or no study on the complementary effect of both female members in the board and female members outside the board especially in Nigeria, to the best of the author's knowledge. Hence, the need to consider the effect of gender diversity and the financial performance of Nigerian banks.

2 Literature Review

2.1 Theoretical Review

According to theories, gender diversity in board members can have an influence on performance through a variety of mechanisms. Various theories explain the relationships between gender diversity in an organisation and the performance of firms in economic literature. These theories include most commonly agency theory, upper echelons theory, resource dependency theory and social identity theory (Ali et al., 2011; Christiansen et al., 2016; Campbell & Bohdanowicz, 2015).

Ellwood and Garcia-Lacalle (2015) stated that according to upper echelons theory, the qualities of the board of directors such as experiences, personalities, and values influence firm outcomes. Males and Females possess different qualities; therefore, gender diversity could influence the performance of firms. Also, Christiansen et al. (2016) affirm that greater representation of women on the boards can boost innovation and critical thinking. Upper echelons theory may also be used to better understand the relationship that exists between gender diversity on the board and financial performance in the banking industry. According to this theory, board members' traits such as age, gender, education, and job experience might impact the organization's strategic decisions. Overall, the idea implies that gender diversity in senior roles can favorably benefit a bank's strategic decisions and financial performance. Companies that promote gender diversity at the highest level may benefit from a broader range of ideas and experiences, resulting in enhanced decision-making and, ultimately, enhanced financial performance.

One of the key ideas used in explaining the favorable influence of board gender diversity on financial performance is the agency theory. Gallego-Álvarez et al. (2010) stated that; gender diversity is among the vital essential corporate governance mechanism for organisations, according to the agency theory. Reguera-Alvarado et al. (2017) stated that board gender diversity provides greater control because a wide range of viewpoints and perspectives heightens the independence of the board. As a result, gender-diverse boards can be a cost-cutting tool for agency costs (Reguera-Alvarado et al., 2017). According to agency theory, greater participation of women on boards may improve financial performance by managing the firm's operations and better monitoring (Campbell & Bohdanowicz, 2015). Members of the board who are females are more involved, ask more questions, and come to meetings more prepared than the male board members (Adams & Ferreira, 2009). All of these features may contribute to a better decision-making process.

The resource dependency theory emphasized the impact of external factors on organisational behavior; within the context of resource dependence theory, managers may take efforts to minimize dependence (Hillman et al., 2009). According to this theory, organizations with more diverse workforces are better equipped to recruit and retain talent, especially from underrepresented groups. This allows the organization to have access to a greater pool of talents and expertise, providing a competitive advantage and perhaps leading to improved financial performance. According to Pfeffer (1972), boards help companies to reduce reliance and obtain resources. Female gender on boards can increase business performance for the reason that women contribute unique and valuable perspectives to the board.

Social identity theory proposed. It is another reason diversity might have a detrimental influence. Given the social identity theory, when we first meet someone, we categorize them as belonging to an in-group (the same group as us) or an out-group (not belonging to our group). It claims that diversity lowers productivity and income by lowering group cohesion and commitment. Based on a combination of Social Identity Theory (Turner et al., 1987), this position says that in gender-diverse organizations, people are more likely to build positive connections with ingroup members (those of their gender) than with outgroup members (those of a different gender). This can lead to stereotyping and conflict as well as a breakdown in group unity and collaboration, diminishing efficiency (Ali et al., 2011).

2.2 *Empirical Review*

Gender diversity on a bank's board is critical for decision-making clarity and innovation (García-Meca et al., 2015). The varied and balanced board includes people with diverse skills, expertise and experience to supplement the firm's performance. Many empirical papers have previously been published that investigate the relationship that exists between women in leadership and firm performance of firms. Though, the outcomes are not consistent. Even though some literature discovered a positive effect between gender-diverse boards and financial performance

(Carter et al., 2003; Lückerath-Rovers, 2013; Khan & Vieito, 2013; Brahma et al., 2021; Arvanitis et al., 2022) others discovered neither (Miller & del Carmen Triana, 2009) nor a negative effect (Adams & Ferreira, 2009; He & Huang, 2011; Ahern & Dittmar, 2012). Hereafter, the proof of the effects of gender-diverse boards and financial performance remains inconclusive. Palvia et al. (2015) stated that women's presence at various managerial levels and on corporate boards varies greatly across all nations. Academics believe that having women on boards improves banks by lowering risks and promoting prudent financial decisions. Furthermore, by elevating women to positions of power, banks may give vital inspiration to their whole pool of female employees while also strengthening the process of sustainable growth (Birindelli et al., 2019). Further, Dadanlar and Abebe (2020) suggested that women CEO-led companies have a low probability of discrimination lawsuits. Luo et al. (2017) emphasized that larger board female representation is related to lesser levels of real activity manipulation. Board gender diversity is among the most contentious subjects in banking literature. The major goal is to investigate the effect of female board presence on bank financial performance. To the best of the authors' knowledge, most papers considered gender diversity in the board room while this paper will be considering the complementary effect of gender diversity on and off the board room.

3 Methodology

3.1 Population, Sample and Sources of Data

The article mainly focused on Nigeria's listed Deposit Money Banks (DMBs). Twenty-four DMBs that are listed on the Nigerian Exchange Group as of 2021 make up the study's population. Purposive sampling was used in this study for selecting 11 Deposit Money Banks whose stocks were actively traded on the stock market during the sample period and for which pertinent data were readily available. The audited financial statements of the chosen DMBs and the Nigerian Exchange Group factbook were used as sources for data for the years 2010 to 2021. The data used includes the data from the eleven DMBs in Nigeria. The rationale for selecting only banks trading as of first January 2010 is because this was the period that the regulatory authority required the Deposit Money Banks to commence a uniform accounting period.

3.2 Model Specification, Measurement of Variable & Data Collection Technique

The Independent variables for this study were categorized into two basic components; namely; Off-Board gender diversity, and On-Board gender diversity. Off-Board gender diversity is a category of employees that are not members of the board while On-Board gender diversity are categories of individuals that are majorly board members. The dependent variable for this study is the Return on Assets (ROA). Return on Assets (ROA) is considered one of the important measures of financial performance because it provides insight into a company's ability to generate profits from its assets. ROA is a standardized financial metric that is widely used and accepted in the business community. This allows for easy comparisons across different companies and industries. It facilitates benchmarking and helps investors make informed decisions.

In ensuring the robustness of the result, the control variables include board meetings, firm age, firm size, inflation, and leverage. The variables classified under On-Board Gender Diversity are, Female CEO (FCEO) is a dummy variable in banks where the CEO is a woman that equals 1 and 0 otherwise; Female Chairperson (FCH)—Dummy variable that equals 1 in banks with a woman as the Chairperson and 0 otherwise; Female Risk Committee Gender Diversity (FRC) is measured as the number of female risk committee members divided by risk committee members size, Female Audit committees (FAC)—proportion of women in the audit committee in relation to the total audit committee; Female Executive to Total Executive (FETE) - Proportion of women as executive directors over total members executive directors; Female Non-Executive to Total Non-Executive Directors (FNTN)—Proportion of women as no executive directors over total non-executive directors; while the variable classified under Off-Board Gender Diversity is Employee gender diversity (EGD) is the equitable or fair representation of individuals of various genders from entry-level to the rank directly behind the assistant general manager.

The following is the regression model used to examine the relationship between on and off-board gender diversity and financial performance.

$$\begin{aligned} ROA_{it} = X_{it} + FRC_{it} + FCEO_{it} + FCH_{it} + FAC_{it} + FETE_{it} + FNTN_{it} \\ + +EGD_{it} + LEV_{it} + AGE_{it} + SIZ_{i} + INF_{it} + BMET_{it} + \varepsilon_{it} \end{aligned} \quad (1)$$

Following the aforementioned literature and in an attempt to answer the research objective, this paper employs a quantitative research method. This research method is regarded as suitable for achieving the research objectives which aim to investigate the effect of gender diversity on the financial performance of the DMBs which is the core focus of this paper. This paper employed a panel data technique. The study estimates regressions including the variables while controlling for the bank-specific and microeconomic variables. For further and robust analysis, the gender diversity composite score was also generated using a principal component analysis of the proxies for gender diversity using a varimax rotation. While the model was estimated using the panel GLS model which is robust to the residual misnomer.

4 Results and Discussion

4.1 Descriptive Statistics

In examining the effect of on-board and off-board gender diversity and financial performance of the Nigerian DMBs; Table 1 shows the mean, standard deviation, kurtosis and skewness, values of variables in the model.

The summary statistics for the variables being examined are shown in Table 1. It can therefore be seen that on average Female representative in the risk committee is 0.198, with a standard deviation of 0.105. This depicts that an average of 19 percent of females constitute the risk committee. Female Executive to Total Executive Directors has a mean value of 0.161 and a standard deviation of 0.171 while Female Non-Executive in relation to Total Non-Executive Directors had a 0.618 mean value with a standard deviation of 0.277. The mean value for Board Meetings was 6.675 with a 2.76 standard deviation, which shows that an average of about 7 meetings were held in a year. The firm age averaged 50.636 with a standard deviation value of 33.726. Leverage had a mean value of 0.063 with a standard deviation of 8.452. The inflation Rate reported a mean value of 0.119 and 0.027 standard deviation.

Table 1 Descriptive statistics

	Mean	Std. Dev.	skewness	kurtosis
FRC	0.198	0.105	−0.218	2.27
FCEO	0.101	0.302	2.651	8.029
FCH	0.126	0.333	2.253	6.078
FAC	0.120	0.344	−5.416	33.316
FETE	0.161	0.171	0.830	2.972
FNTN	0.618	0.277	0.398	4.936
EGD	0.4440	0.3954	4.4192	25.139
BMET	6.675	2.76	1.480	4.84
AGE	50.636	33.726	0.796	2.491
LEV	0.063	8.452	−10.845	118.749
INF	0.119	.027	0.158	2.035
SIZ	9.052	0.54	−1.472	8.703

Source: Authors' Computation (2023)

4.2 Correlation Matrix

The correlation analysis between the relevant variables was presented in Table 2. It shows that the variables' overall correlation is negligibly low—less than 0.6—across the relationships. The result shows that the explanatory variables do not have a correlation value of up to 1 with each other. This implies that the model was free from the problem of multicollinearity. The correlation results also showed that all variables display considerable variation among each other, thereby justifying the use of panel estimation techniques. According to Hair et al. (2014), a correlation of less than 0.9 cannot cause serious multicollinearity issues.

4.3 Heteroscedasticity Test

White's test
H0: Homoskedasticity
Ha: Unrestricted heteroskedasticity
chi2(27) = 76.42
Prob > chi2 = 0.0000
Cameron & Trivedi's decomposition of IM-test.

The homosckedastic of the residual is yet another result of a classical regular least square. The study used a white test, Cameron & Trivedi's heteroskedastic, which is superior when the error term is not normally distributed. The three model shows that there is the problem of heteroskedastic as indicated by a p-value of 76.420(0.000) which is less than 5%.

To measure the effect of on- and off-board gender diversity on the financial performance of sampled Nigerian deposit money banks, a multivariate analysis employing panel regression was used. The results are displayed in Table 3. Here, the granulated representation of gender diversity was used using seven variables: FRC, FCEO, FCH, FAC, FETE, FNTN & EGD. Different panel regression estimators were taken into consideration to increase the regression analysis's robustness. The first Model is the Pool OLS which is followed by the Random effect Model and Panel GLS. Panel GLS was employed as Model 3 to further confirm the coefficient estimations' robustness. Panel GLS adopts feasible GLS estimators to achieve robust standard errors, particularly robust to possible residual misnomers like autocorrelation and heteroscedasticity that may bias the result. From the result, as shown in Table 4, the model suffers from Heteroskedasticity. Instead of that, GLS is more appropriate when the model is suffering from heteroskedasticity. The Wald test in Table 5 revealed that the P value is less than 5%. When the p-value associated with independent variables in a regression model is less than 0.05, the Wald chi-square test suggests that the variable is statistically significant and has a meaningful impact on the dependent variable (Return on Asset).

Table 2 Correlation matrix

Variables	FRC	FCEO	FCH	FAC	FETE	FNTN	EGD	BMET	AGE	LEV	INF	SIZ
FRC	1.000											
FCEO	0.23*	1.000										
FCH	0.25*	0.125	1.000									
FAC	0.47*	0.032	0.090	1.000								
FETE	0.47*	0.140	0.093	0.45*	1.000							
FNTN	0.29*	−0.04	−0.00	0.41*	0.28*	1.000						
EGD	−0.08	−0.3*	0.111	−0.00	−0.09	0.174	1.000					
BMET	0.070	0.163	−0.02	0.42*	0.38*	0.158	0.110	1.000				
AGE	0.168	0.039	0.21*	−0.3*	−0.3*	−0.15	0.105	0.080	1.000			
LEV	−0.03	0.043	0.036	0.091	0.094	−0.02	0.049	0.058	−0.03	1.000		
INF	0.104	0.095	0.160	−0.04	0.007	0.043	−0.03	0.068	0.024	−0.04	1.000	
SIZ	0.31*	−0.09	0.31*	0.29*	0.25*	0.33*	0.51*	0.162	0.19*	0.51*	0.031	1.000

Source: Authors' Computation (2023)
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Table 3 Regression estimates (granulated measure of gender diversity)

	(1)	(2)	(3)
Variables	Pool OLS	Random Effect	Panel GLS
FRC	0.03	0.03	0.03
	(0.03)	(0.04)	(0.04)
FCEO	0.04*	0.04*	0.04*
	(0.01)	(0.01)	(0.01)
FCH	0.00	0.00	0.00
	(0.00)	(0.01)	(0.01)
FAC	−0.02*	−0.02***	−0.02**
	(0.01)	(0.01)	(0.01)
FETE	0.12**	0.12**	0.12**
	(0.06)	(0.06)	(0.06)
FNTN	0.04*	0.04**	0.04*
	(0.01)	(0.02)	(0.01)
EGD	−0.01**	−0.01**	−0.01**
	(0.01)	(0.01)	(0.01)
BMET	−0.00*	−0.00*	−0.00*
	(0.00)	(0.00)	(0.00)
AGE	−0.00	−0.00	−0.00
	(0.00)	(0.00)	(0.00)
LEV	−0.10*	−0.10*	−0.10*
	(0.00)	(0.00)	(0.00)
INF	−0.19**	−0.19***	−0.19**
	(0.08)	(0.10)	(0.10)
SIZ	0.05*	0.05*	0.05*
	(0.01)	(0.01)	(0.01)
Constant	−0.20**	−0.20*	−0.20*
	(0.08)	(0.07)	(0.06)
Observations	130	130	130
Number of Firms	11	11	11

Source: Authors' Computation (2023)
Robust standard errors in parentheses *$p < 0.01$, **$p < 0.05$, ***$p < 0.1$

Table 4 Heteroscedasticity test

Source	chi2	df	P
Heteroskedasticity	76.420	27	0.000
Skewness	8.450	6	0.207
Kurtosis	2.530	1	0.112
Total	87.400	34	0.000

Source: Authors' Computation (2023)

Table 5 Wald test

Statistics	Value
Wald Chi 2	191,937
P value	0.000

Source: Authors' Computation (2023)

However, for this study, the panel GLS model (model 3) is used to explain the relationship between the dependent variable (ROA) and the explanatory mix. Specifically, out of the seven on-board and off-board gender diversity variables; five variables revealed significant effects on the financial performance of DMBs. The variable for onboard gender diversity that showed significant effects are FCEO, FAC, FETE, and FNTN while the only proxy for off-board gender diversity which is EGD also revealed a significant effect on financial performance. It must also be noted that FCEO, FETE, and FNTN revealed a positive relationship with financial performance while EGD and FAC negatively affected ROA. Also, the following Control variables (BMET, LEV, INF and SIZ) revealed a significant effect on the financial performance of the DMBs. It must also be noted BMET, LEV & INF share a negative relationship with financial performance while firm size revealed a positive and significant effect on performance.

Specifically, FCEO (p-value = 0.000, t-value = 3.77 & Coefficient = 0.044) positively and significantly drives financial performance (ROA). This shows strong evidence that a female Chief Executive Officer would positively drive the financial performance of the DMBs. This means that companies with female CEOs tend to achieve higher ROA compared to companies without female CEOs. Having a female CEO brings a different perspective and set of experiences to a company's leadership. Women may bring unique insights and approaches to problem-solving, decision-making, and strategic planning. This diversity of perspectives can lead to more innovative and effective strategies that contribute to improved financial performance. A positive value in the regression coefficients indicated that the DMBs led by female CEOs are at the higher reward of an upturn in their financial performance. The result agrees with Jalbert et al., 2013. Also, FNTN (p-value = 0.006, t-value = 2.73 & Coefficient = 0.039) and FETE (p-value = 0.028 t-value = 2.20 & Coefficient = 0.125). 033, t = 2.07 & t = 0.023) positively and significantly drives financial performance (ROA). The given statistics concerning FNTN indicates that a higher proportion of female non-executive directors relative to the total number of non-executive directors has a positive and significant relationship with performance. This suggests that having more female representation in non-executive roles is associated with improved performance outcomes. Companies with gender-diverse boards, including female NEDs and executive directors, often have a positive reputation for being inclusive and progressive. This can enhance the company's brand image, attract customers, and strengthen relationships with various stakeholders. The findings revealed that FAC (c = −0.023, t = −2.07 & p = 0.039) and EGD (p-value = 0.026, t-value = −2.23 & Coefficient = −0.012) which is an off-board gender diversity; negatively and significantly drives financial performance (ROA). Gender diversity among employees may be an indication of underlying gender disparities in the workplace, such as unequal opportunities for career advancement, wage gaps, or biased promotion practices. If female employees face discrimination, systemic barriers that limit their career growth and progression, it can result in lower motivation, reduced commitment, and ultimately, decreased financial performance.

Leverage showed a negative and significant effect on the financial performance of DMBs. ($c = -0.104$, $t = -267.52$ & $p = 0.000$). In other words, higher levels of leverage tend to be associated with lower financial performance. As leverage increases, banks may need to pay higher interest payments on their debt. This can lead to increased costs, reducing the bank's profitability and overall financial performance. Leverage could signal problems in the company's management and create low confidence in the company, negatively affecting an entity's financial performance. The result is also in consonance with Ibhagui and Olokoyo (2018) and Akinadewo et al. (2023). Firm size revealed a positive and significant effect on the financial performance of DMBs. ($c = -0.046$, $t = 4.61$ & $p = 0.000$). The result aligns with Satriyo and Harymawan (2018). According to economic theory, large firms can experience economies of scale and scope, reduce costs via specialization, and more effective implementation of operations.

4.4 Panel GLS

ROA	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Gender Diversity	0.010	0.004	2.71	0.007	0.003	0.018	*
Board Meeting	−0.005	0.001	−3.92	0.000	−0.007	−0.002	*
Age	0.000	0.000	−1.65	0.098	0.000	0.000	***
Leverage	−0.104	0.000	−279	0.000	−0.104	−0.103	*
Inflation Rate	−0.027	0.114	−0.23	0.815	−0.250	0.197	
Firm Size	0.036	0.007	5.13	0.000	0.022	0.049	*
Constant	−0.174	0.063	−2.78	0.005	−0.296	−0.051	

Mean dependent var	0.131	SD dependent var.	1.040
Number of obs	130.000	Chi-square	116044.064
Prob > chi2	0.000	Akaike crit. (AIC)	−349.469

Source: Authors' Computation (2023)
*$p < 0.01$, **$p < 0.05$, ***$p < 0.1$

Table 5 shows the Panel GLS model which is used to explain the relationship between the dependent variable ROA and the explanatory mix. The gender diversity score was derived from the Principal Component Analysis of the proxies for gender diversity using a varimax rotation (see Table 4.6 in the appendix). Specifically, it can be seen that gender diversity maintained a positive and significant relationship with ROA. By implication, a unit change in gender diversity increases ROA by 1%, ceteris paribus. The result also shows strong evidence that Firm size and Gender diversity could drive Return on Assets. It should be noted that all other control variables share a negative relationship with performance except the Inflation Rate & Board meeting.

5 Conclusion and Recommendation

This paper offers new insight into the impact of board gender diversity on the financial performance of DMBs in Nigeria by exploring both on-board and off-board gender diversity and some other control variables from 2010 to 2021. The study revealed that the variable for onboard gender diversity that showed significant effects are FCEO, FAC, FETE, FNTN while the only proxy for off-board gender diversity which is EGD also revealed a significant effect on financial performance. Also, the following Control variables (BMET, LEV, INF and SIZ) revealed a significant effect on the financial performance of the DMBs. The results have shown that gender diversity on-board and off-board is a significant factor influencing the performance of DMBs. The findings also have interesting practical implications for government policy, management policy and corporate governance. Our findings imply that board gender diversity may promote the strength of corporate governance and reduce the likelihood of agency conflicts, enhancing performance. Thus, the study draws the attention of regulatory authorities especially the Nigerian Securities and Exchange Commission to legislate and mandate the appointment of female board members on the board and also establish a reasonable threshold for females on the board of companies especially the DMBs. This paper contributes to raising awareness about the relevance of gender diversity in the financial sector in Nigeria and advocating for greater inclusion and equality.

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Influence of Digital Era 4.0 on Youth Empowerment and the Achievement of SDGs in Namibia?

Merry Loise M. Nghihepavali and Tia Tariro Chata

Abstract The study aimed to examine the influence of Digital Era 4.0 on youth empowerment and the achievement of Sustainable Development Goals (SDGs) in Namibia. Digital Era 4.0 is the independent variable, which is the factor that was examined to assess its influence on the achievement of the dependent variable, the SDGs 4, 8 and 10. A quantitative research approach was used and 80 surveys conducted with final year School of Accounting students, of the University of Namibia (UNAM) as its population to collect primary data, there was no sampling done since the population was not time-consuming or resource-intensive to gather data from every individual thereby, making sampling unnecessary. A comprehensive literature review was conducted to identify the various sustainable development strategies that have been implemented in other countries with similar challenges to Namibia. Quantitative data were analysed using descriptive and inferential statistics to summarize and describe variables related to access to digital technologies and SDGs achievement. The findings were that there is a positive and strong correlation between the Digital Era 4.0 and the achievement of SDGs. The hypothesis testing concluded that Digital Era 4.0 has a positive and strong impact on SDGs to achieve youth empowerment and reduce wealth gaps. The study recommends that the Namibian government and its agencies through their initiatives, strengthen policies that focus on refining access to quality education, healthcare, career opportunities, and financial resources that can help level the playing field and empower the Namibian youth.

Keywords Digital Era 4.0 · Inequality · SDGs 4 · 8 & 10 · Youth · Empowerment

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1 Introduction

According to Chancel et al. (2022) and Asamoah (2021) Namibia is one of the most unequal countries in the world in terms of income distribution, with the large amount of resources owned by a small population, the elite holding a disproportionate amount of resources of the countries. Since the independence of Namibia, 1990, the government has taken strides to provide services to the citizenry and to redistribute the wealth evenly and reduce the wide gaps between the wealthy and the poor. These efforts scarcely reduced the inequality gaps due to factors founded on the historically prevalent state of the country. Therefore, despite being classified as an upper-middle-income country, the majority of the population still lives in abject poverty. Ultimately, the country faces significant challenges in terms of unemployment and income inequality, with the informal sector being the largest employer.

The SDGs and the strategies in place are a response to these significant imbalances to help narrow the extreme wealth gaps. These are such as improved economic growth, and access to basic services like education, and health facilities, thereby reducing poverty and increasing equality. The Digital Era 4.0 has had a significant impact on the economies of Southern Africa, including Namibia which Hoosain et al. (2020) postulates that this era has become the means and solutions to many of the world's problems as is facing developing countries in general and Namibia in particular. While Chauke et al. (2023), and Andreoni et al. (2021) contends that the Digital Era 4.0 has brought many benefits, such as increased productivity and efficiency, it has also worsened existing wealth imbalances in the region in that the wealthy are advancing and that the poor are falling behind.

Chauke et al. (2023) points to the main challenge brought about by the Digital Era 4.0 as the digital divide and hence by understanding these dynamics, the study aimed to provide insights and recommendations to address the challenges and the opportunities presented by the Digital Era 4.0 through the promoting inclusivity, reduce inequality, and the achievement of the SDGs in Namibia.

1.1 Research Study Objectives, Questions and Hypothesis

The objectives of this research study were to examine the influence the Digital Era 4.0 has on the youth population and to secondly, explore the association between the Digital Era 4.0 and the achievement of SDGs in Namibia.

The research questions were, Does the Digital Era 4.0 influence the youth population in Namibia? And is there an association between the Digital Era 4.0 and the achievement of SDGs in Namibia?

The research hypothesis was as follows: Null Hypothesis (H_0): The Digital Era 4.0 has no significant influence on youth empowerment, wealth inequality reduction, and the achievement of SDGs in Namibia. Alternative Hypothesis (H_1): The Digital

Era 4.0 has a significant influence on youth empowerment, leads to a reduction in wealth inequality, and contributes to the achievement of SDGs in Namibia.

1.1.1 Conceptual Model

Figure 1 above depicts the relationship between the variables Digital Era 4.0 and the SDGs 4, 8 & 10. The hypothesis is that Digital Era 4.0 has a positive influence on youth empowerment, reduces wealth inequality, and contributes to the achievement of Sustainable Development Goals (SDGs) in Namibia.

1.2 Limitations of the Study

This section discussed the limitations of the study to provide a comprehensive and translucent valuation of the study's findings and to guide future research in addressing these limitations. This section also provided ways in which the study mitigated the limitations. The first limitation of this study was the relatively small population size of 80 students. A larger population size would provide more robust and consistent results, allowing for better generalizability to the target population. To mitigate this limitation, the study opinions to the unique population characteristics; the population is the University of Namibia final year students, the UNAM being a national university makes this population disposed for data collection since the population is exposed to the highest education from this invested government institution. Considering that these students have experienced education in the Digital Era 4.0, it made them relevant to the study. The population are anticipated to showcase how this education empowered them for the market and economic growth. The specific context of Namibia helped mitigate concerns about generalizability and provide a nuanced understanding of the local dynamics. The other limitation is the

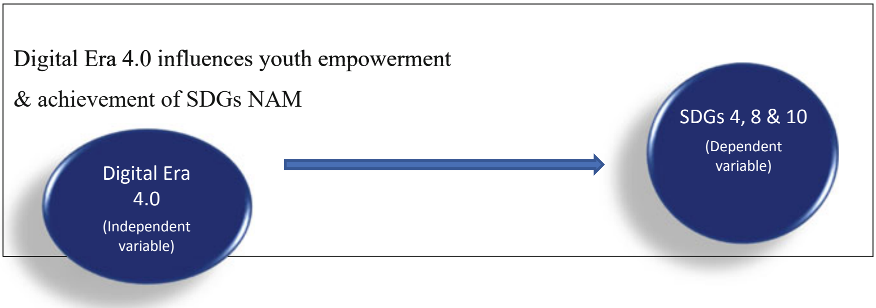


Fig. 1 Process through which the independent variable influences the dependent variable – designed by authors

reduced statistical power, with a smaller population/sample, the statistical power of the analysis may be limited. A larger sample size would enhance the statistical power, increasing the chances of detecting meaningful findings. To mitigate this limitation, the research study clearly communicated the scope and generalizability of the findings, emphasizing that the study results pertain specifically to this research study population to ensure transparency which should benefit readers to understand the limitations of generalizing the results to broader populations. Lastly the limitation of quantitative focus, focusing solely on quantitative measures negates the importance of qualitative insights and nuances related to youth empowerment and SDG achievement may be missed. To address this limitation the study incorporated information from other qualitative research studies to bring in the balance. It also recommended that a mix method study be done in the future to incorporate qualitative approach to this study, such as interviews or focus groups which would provide a deeper understanding of the experiences, perspectives, and contextual factors influencing the variables under study.

The paper is divided into four main sections, the first section explores existing research on the topic in the form of a literature review. This is followed by a description and justification of the research methodology employed in this study. Later, the findings are discussed, and ensuing conclusions provided.

2 Literature Review

Several authors echo that the Digital Era 4.0 symbols a new era of technological development characterized by the integration of advanced technologies such as artificial intelligence, the internet of things and robotics (Ntinda, 2022; Andreoni et al., 2021; Yadav et al., 2023; Asa et al., 2021). These innovations have the potential to revolutionize the way media and creative content is produced, making it faster, cheaper, and more efficient (Ntinda, 2022; Andreoni et al., 2021).

2.1 Technological Determinism Theory

The paper considered the technological determinism theory in support of this study, a reductionist theory that deduces that a society's technology drives the development of its social structure and cultural values. The theory was originated by Thorstein Veblen (1857–1929), an American sociologist. This framework suggests that technology, such as the Digital Era 4.0, has a significant impact on society and can shape social, economic, and cultural outcomes. The elements of the technological determinism are as follows: autonomous technological development, a perspective that assumes that technology follows its own trajectory of development, independent of social or cultural factors (Frischmann & Selinger, 2018; Durham Peters, 2019; Zuboff, 2019). Accordingly, Fang et al. (2019) postulates that technological determinism suggests that technology has a deterministic influence in that it shapes and determines social, economic, and cultural outcomes. Technological determinism argues that technology is a powerful force that overarching influences social change (DiMaggio, 2019; Vargo et al., 2020).

This theory complements this research study in that it recognizes the potential transformative effects of digital technologies on various aspects of society, including education, employment, social inclusion, and access to resources. By adopting a technological determinism perspective, the study explored how the Digital Era 4.0 has the influence to shape the dynamics of youth, inequality, and the progress towards sustainable development in Namibia, considering both the opportunities and challenges that arise from technological advancements.

2.2 Empirical Review

The following sub-themes were used in this study to examine literature on the research question through identifying, selecting, and critically evaluating existing empirical studies in order to gain insights and draw conclusions about the study.

2.3 Sustainable Development Goals in Namibia

This research study focused only on 3 SDGs (out of the 17) which are interconnected to the research study. These are:

SDG 4. Quality Education: which promotes that by 2030 there be improved access to equitable quality education in the country for the youth. Education that promotes an enduring learning opportunity, through which young people can acquire the knowledge and skills that should equip them to participate fully in society and the economy. With a quality education, young people would be equipped for a decent work and promote economic growth.

SDG 8. Decent Work and Economic Growth: which states that by 2030, Namibia should promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. That through the creation of job opportunities, promotion entrepreneurship, the youth can be empowered to contribute to their economies.

SDG Goal 10: Reduced Inequalities: this entails that by 2023 the country should reduce income inequalities, social barring, and discernment, ensuring that the youth in Namibia have equal opportunities to participate in decision-making processes and have an equal access to resources. (*Extract from the Sustainable Development Goals: United Nations in Namibia).*

Accordingly, Meherali et al. (2021) identified some opportunities for youth through digital inclusion and connectivity, which is having greater access to information, communication, and online platforms for participating in decision-making processes. Adding that enhancing youth's digital literacy can enable them to access and utilize resources effectively, increasing their participation in decision-making (Meherali et al., 2021; Jung et al., 2022). The Digital Era 4.0 has brought about significant changes in the way societies function, and while these technological advancements have created numerous opportunities, like e-commerce where by the rise of the internet and digital technologies has revolutionized the way businesses operate, they have also exacerbated wealth imbalances in countries like Namibia. To address these challenges, governments in these countries need to invest in digital infrastructure and create policies that support entrepreneurship and innovation, which can help to reduce income inequality and promote inclusive growth (Meherali et al., 2021).

2.4 Digital Era 4.0 and Factors that Influence Access

There are several factors that influence access to digital technology amongst youth in developing worlds. According to Chege and Wang (2020); Szymkowiak et al. (2021), digital technology depends on the type and quality of the infrastructure provided by the authority. The infrastructure being reliable power and power sources, internet connectivity and telecommunications networks amongst other things. Access to digital technologies is heavily reliant on infrastructure, without which it becomes impossible to experience digital technology. While Mercader and Gairín (2020) supports the notion above, they add that in developing countries, chiefly in rural areas, inadequate infrastructure can be a significant barrier to accessing digital technologies.

Secondly the issue of affordability and the cost of digital devices, such as smartphones, computers, and internet services, can be prohibitive according to authors such as Graves et al. (2021); and Hernandez (2023). This is because several people in the developing world lives in abject poverty. The costs and recurring expenses for data plans or internet access also limit access to digital technologies in people who live in poor communities. Another factor that limits access to digital technologies is education and digital literacy. According to Sony et al. (2020), some technology users may fail to navigate the internet and exploit the opportunities offered by digital technologies due to lack of education. Another factor that influence limited access to digital technology is the lack of government policies and regulations that are supportive and that promote digital infrastructure development and innovation to communities. Lastly, digital divides, which is the gap between the haves and the have nots influence access to digital technology, income inequality, geographic location, and socioeconomic inequalities play a critical role in access to technology, argues Lembani et al. (2020).

2.5 Achievement of the SDGs and Youth Empowerment Initiatives

The achieving of the SDGs and empowering youth in the developing world go hand in hand. Engaging young people in the implementation of the SDGs not only helps to address the challenges faced by their communities but also ensures the sustainability of development efforts. Here are some ways to achieve the SDGs and empower youth in the developing world. According to several authors (Okoli, 2022; Chitiyo et al., 2019) the provision of quality education and skill development opportunities to young people is vital for youth empowerment. Governments and supporting organizations should invest in accessible and inclusive education systems that equip youth with the knowledge and prerequisite skills to actively participate in sustainable development initiatives (Chitiyo et al., 2019). Furthermore, Li et al. (2020) contends that government should provide support for young entrepreneurs through offering training, access to finance, mentorship programs, and business incubation centers. Encouraging innovation and the use of technology can also empower youth to find creative solutions for sustainable development. By implementing these strategies, the world can provide an enabling environment for youth empowerment while advancing progress towards the SDGs in the developing world. Engaging and empowering young people is not only a matter of social justice but also a key driver of sustainable development and a promising investment in the future.

2.6 Impact of Wealth Imbalances on Youth Empowerment

Wealth imbalances can have significant adverse effects on youth empowerment. Kuddus et al. (2020) contends that there is a large gap between the wealthy and the poor, which creates disparities in access to resources and opportunities, which can hinder the empowerment of young people. According to Chiripanhura (2022); Wealth et al. (2023), wealth inequality causes limitation to youth access to quality education, which can further hinder the intellectual development of future prospects of youth resulting in failure to empower them with knowledge and skills. Furthermore, Shifotoka (2022) augments the idea by stating that when youth has no knowledge or limited education, the result is limited career opportunities for and further resulting in underemployment. Of which Theis et al. (2021) concludes by stating that this lack of access to career opportunities can restrict the ability of young people to gain valuable experience, develop their skills, and achieve their full potential.

Several authors in their study Chirisa et al. (2020) maintains that poverty reduces access to healthcare and basic services, nutritious food, and adequate housing. That this limited access to these essential services can negatively impact their physical and mental health, limiting their ability to participate fully in society and pursue their goals (Chirisa et al. 2020; Wealth et al., 2023). Wealth imbalances can create financial barriers for youth who aspire to start their own businesses or pursue entrepreneurial ventures. According to Dadzie et al. (2020) limited access to finances and investment opportunities can hinder the ability of young people to turn their ideas into feasible initiatives. Lack of financial resources can hinder their creativity, innovation, and economic empowerment and social exclusion and marginalization: Youth from economically disadvantaged backgrounds often face social exclusion and marginalization, which could undermine their sense of self-worth and confidence. Governments of such communities should address these by developing policies that focus on improving access to quality education, healthcare, career opportunities, and financial resources can help level the playing field and empower young people.

3 Research Methodology

The research paper addresses the question, what is the influence of the Digital Era 4.0 on youth empowerment and the achievement of sustainable development goals in Namibia? The variable that is hypothesized to have an effect on the dependent variable is Digital Era 4.0. Digital Era 4.0 was allotted as the independent variable since the developments and impacts of the fourth industrial revolution has influence on the empowerment of the youth in Namibia (Mpofu & Mhlanga, 2022; Wealth et al., 2023).

3.1 Research Methodology Summary

Digital Era 4.0 is characterized by emerging technologies such as artificial intelligence, automation, big data, and the internet of things. The dependent variable that is expected to be influenced or affected by the independent variable is the achievement of SDGs 4, 8 and 10 through the reduction of the wealth gaps. Table 1 above indicates the summary of the research methodology.

Table 1 Research methodology

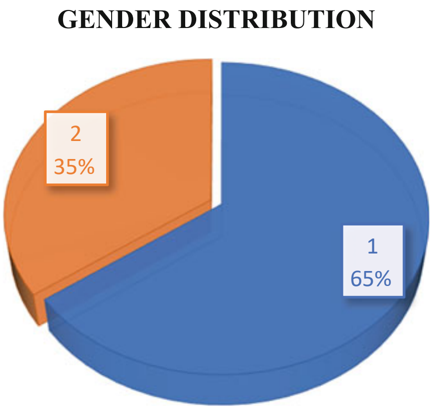
Research design	A quantitative research design was used for a comprehensive understanding of the relationship of the variable involved.
Population & sample	80 final year School of Accounting students, University of Namibia. The target population was relatively small and not time consuming or resource intensive to gather data from every individual, making sampling unnecessary.
Data collection technique	Quantitative data was collected through a survey, secondary data from sources such as government reports, statistical databases
Data analysis	Descriptively and inferential statistics was employed.

4 Research Results & Analysis

The research study collected primary data through a survey which was distributed to the 80 final year School of Accounting students from the University of Namibia, the total population was relatively small, conducting a census was feasible and practical. It was not too time-consuming or resource-intensive to gather data from every individual, making sampling unnecessary. To examine the relationship between the dependent variable (SDGs 4, 8 & 10) and the independent variable (Digital Era 4.0) the research study used the regression analysis as a statistical model. The data collected on the influence of Digital Era 4.0 on youth empowerment and the achievement of SDGs in Namibia was processed and analyzed using the Statistical Package for the Social Sciences (SPSS) software. SPSS was chosen due to its compatibility with quantitative data and its alignment with a positivist research approach. The processed data was subjected to descriptive statistics, including frequencies and percentages, which provided a comprehensive summary of the variables. The data was then coded and presented using tables, pie charts, and bar charts to facilitate clear interpretation. SPSS can be used to compute the means, which provided insights into the average levels of influence perceived by respondents.

Figure 2 above indicate gender analysis of the study from the research survey which was distributed to 80 final year students of the School of Accounting, which was the total population and was not sampled due to being relatively small, that conducting a census was feasible and practical. The gender distribution was indicated to be 65% female and 35% male.

Fig. 2 Gender analysis



4.1 Age Analysis

The research survey was distributed to 80 final year School of Accounting indicated in Fig. 3 that 49 respondents were students in the age group of 18–25 years old and 9 were the respondents between the ages 26–30 years old. It further indicated that 5 were students between the ages of 31–35 years and above.

Q1: Does the digital era 4.0 significant influence youth empowerment in Namibia?

The research survey collected data based on the score ranking from Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree Likert scale of 1–5 and 5 being maximum usage and 1 being minimum usage of digital technology. The results analysed in Tables 2 and 3 indicate a general use of Digital technologies with a 68% highest score in Strongly Agree, and with Agree score ranged between 18% to 28% in all the questions. A poor score of Disagree to Strongly Disagree ranged between 5% to 26% (Table 4).

Q. 2 Does the digital era 4.0 has a significant influence on achievement of SDGS in Namibia?

Table 5 depicts a data analysis of the question Does Digital Era 4.0 has a significant influence on the achievement of SDGs in Namibia. The respondents scored on the sub-question "Do youth have access to quality education" 37% was highest with Neutral followed by Agree and Strongly agree with a total of 37%. The poor score of 26% was for Disagree and Strongly Disagree. On the question does the current education promote sustainable growth and decent work for all according to the SDG 8? The score was 48% of the respondents being unsure and a difference of 10% score between those who Agreed and Disagreed. Those who Strongly Agree were 1% and those who Strongly Disagree were 5%.

Q. 3 To What Extend Does Wealth Imbalances Cause Youth Empowerment?

Table 5 above analysed the data collected on question 3 concerning the wealth imbalances and effect on the Namibian youth empowerment. On the question of corruption and lack of a transparent governance, the highest score was 38% in the

Fig. 3 Age analysis

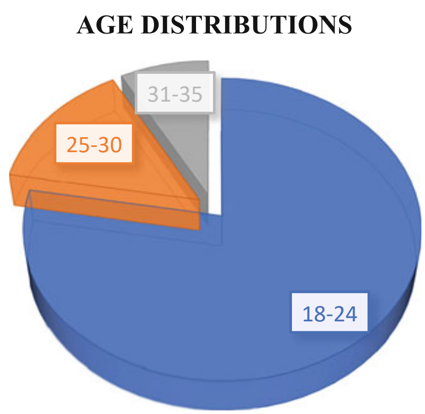


Table 2 Q1: Does the Digital Era 4.0 significant influence youth empowerment in Namibia?

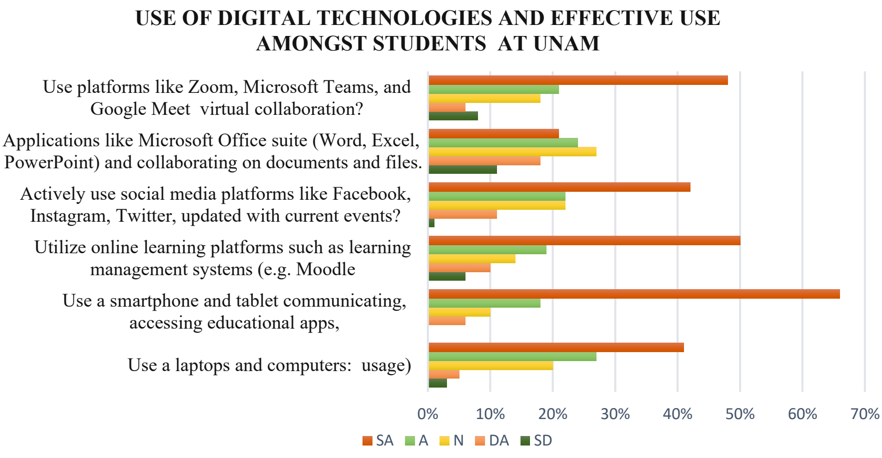
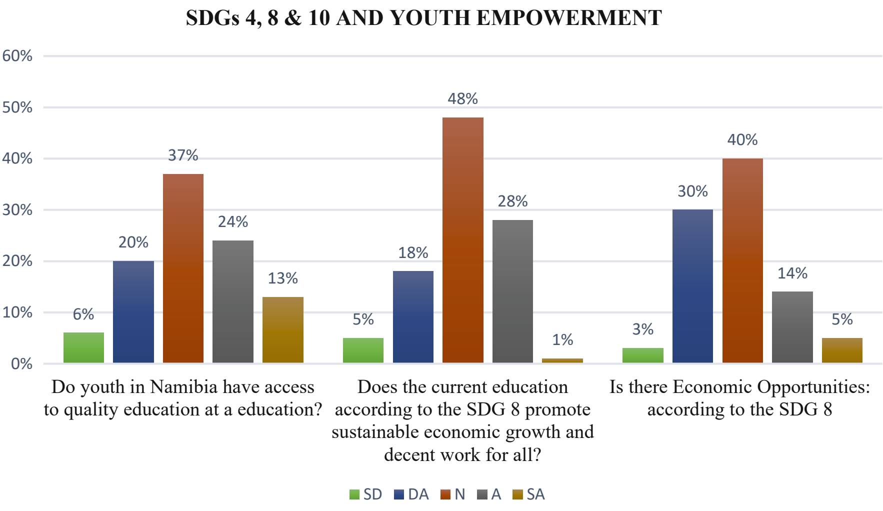


Table 3 Analysis of SDGs 4, 8 & 10 and youth empowerment



affirmative and 5% in the negative. On the limited access to financial services has a highest score as Strongly Agree of 41% and lowest score on Disagree with a 9%. The overall question Strongly Agree that limited finances, unemployment, land

Table 4 Analysis of factors that cause wealth

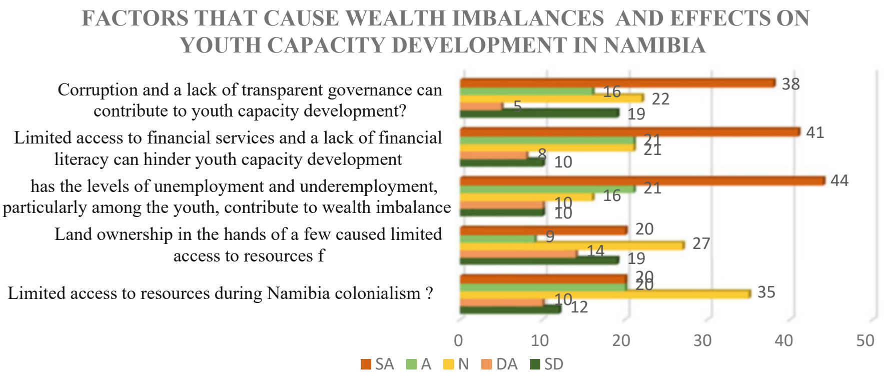


Table 5 Descriptive statistics

Descriptive statistics		
	SDGs 4, 8 & 10	Digital Era 4.0
Mean	6.7302	3.9603
Standard deviation	.83769	.67867
N	63	63

ownership in the hands of few and limited access to resources increases wealth imbalances and had an adverse effect on youth empowerment.

4.2 *Testing the Hypothesis*

The logical steps employed to address the hypothesis using linear regression were as follows:

- Assessing the statistical significance of the association between the response variable and the predictors.
- Examining the effects of the predictors on the response variable.
- Utilizing odds ratios to understand the impact of individual predictors on the response variable.
- Evaluating the goodness-of-fit of the model to determine how well it aligns with the observed data.

4.3 Correlations Analysis

4.3.1 Relationship Between Digital Era 4.0 and Achievement of SDGs

The correlation analysis was done to measure the strength and direction of the relationship between the variable Digital Era 4.0 (e.g., access to digital technologies) and the variables representing youth empowerment, SDGs 4, 8 and 10 achievement (Table 6). The analysis of the Table 4 is that the relationship between the Digital Era 4.0 and the achievement of SDGs has a positive and strong statistical value of 0.826 which lies between 0.7 to 1 at the P value of 0.001 with a 95% confidence level which makes this relationship strong. If the value of correlation is less than 0.3 the relationship is weak, if it lies between 0.3 to 0.7 the relationship is moderate but if the value lies between 0.7 to 1 the relationship of the variable is strong.

4.4 Regression Analysis

After the predictor variable was found to correlate with the dependent variable with a positive and strong statistical value of 0.826 (in the analysis of Table 4) the study conducted a regression analysis to test the hypothesis. The null hypothesis that Digital Era 4.0 has no positive influence on youth empowerment and the achievement of SDGs 4, 8 & 10 in Namibia.

- Null Hypothesis (H_0): The Digital Era 4.0 has no significant influence on youth empowerment, wealth inequality reduction, and the achievement of SDGs in Namibia.
- Alternative Hypothesis (H_1): The Digital Era 4.0 has a significant influence on youth empowerment, leads to a reduction in wealth inequality, and contributes to the achievement of SDGs in Namibia (Table 7).

Table 6 Correlation of variables

		SDGs 4, 8 & 10	Digital Era 4.0
Pearson correlation	SDGs 4, 8 & 10	1.000	.826
	Digital Era 4.0	.826	1.000
Sig. (1-tailed)	SDGs 4, 8 & 10	.	<.001
	Digital Era 4.0	.000	.
N	SDGs 4, 8 & 10	63	63
	Digital Era 4.0	63	63

Table 7 Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.826[a]	.682	.677	.47632	.094

[a] Predictors: (Constant), Digital Era 4.0
[b] Dependent Variable: SDGs 4, 8 & 10

Table 8 ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29.667	1	29.667	130.761	<.001[b]
	Residual	13.840	61	.227		
	Total	43.506	62			

[a] Dependent Variable: SDGs 4, 8 & 10
[b] Predictors: (Constant), Digital Era 4.0

4.5 *Model Summary*

Based on the analysis presented on Table 5, the percent of the variability in the dependent variable which is accounted for by the regression on the independent variable, R^2 is 0.677. Therefore, R squared on the model indicates that the independent variable influence youth empowerment through the achievement of the SDGs of the country at 67.7%. F – Sta (probability) depicts that the model is fit $p < 0.005$ (Table 8).

4.6 *ANOVA*

Based on the analysis presented in Table 6, the ANOVA results indicate that the model is statistically significant as evidenced by the F statistic and the significance value of $p < 0.05$. Therefore, further hypothesis testing was conducted, considering that the model satisfies the predetermined criteria for statistical significance. Therefore, the study rejects the null hypothesis (H_0) that Digital Era 4.0 has no significant influence on youth empowerment and the achievement of SDGs 4, 8, and 10 in Namibia. This inference is based on the observation that the p-value is below the predetermined significance level, providing evidence of a statistically significant relationship between Digital Era 4.0 and the outcome variable (Table 9).

4.7 *Coefficients Analysis*

Based on the analysis presented in Table 7: the unstandardized Beta is at a positive and significant impact which is less than .005 on the SDGs. When Digital Era 4.0 increases by 1 unit SDGs increase by 1.019 unit. Testing the hypothesis that Digital

Table 9 Coefficients[a] analysis

Coefficientsa						
Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. error	Beta		
1	(Constant)	2.694	.358		7.523	<.001
	Digital Era 4.0	1.019	.089	.826	11.435	<.001

[a] Dependent variable: SDGs 4, 8 & 10

Table 10 Residuals statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted value	4.7321	7.5350	6.7302	.69173	63
Residual	−.78263	1.09958	.00000	.47246	63
Std. predicted value	−2.888	1.164	.000	1.000	63
Std. residual	−1.643	2.309	.000	.992	63

[a] Dependent variable: SDGs 4, 8 & 10

Era has a positive impact on SDGs to achieve youth empowerment and reduce wealth gaps. The study concludes that the hypothesis is supported, and the study rejected the null hypothesis and accepts the alternative hypothesis (Table 10).

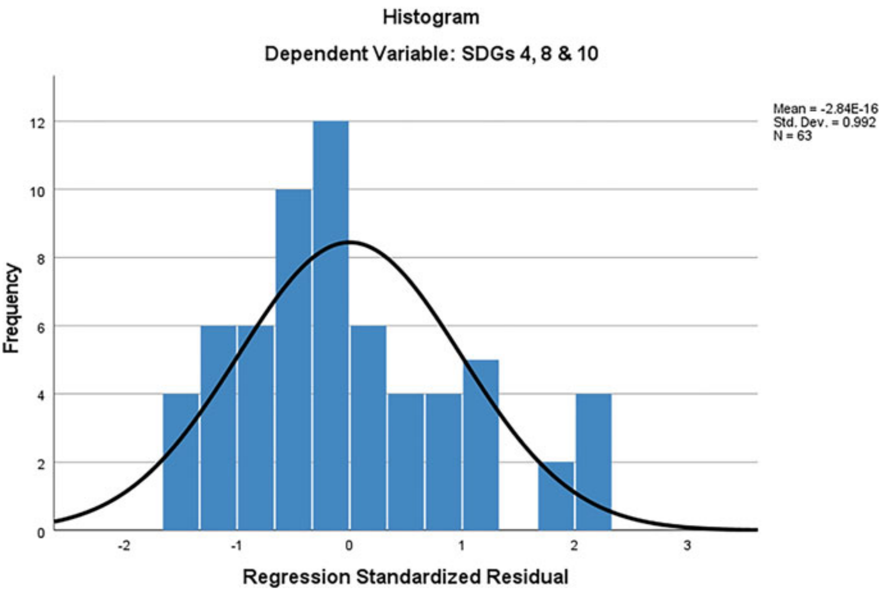
4.8 Residual Statistics

The mean of the residuals indicated .000 the average difference between the observed values and the predicted values from the regression model, which is close to zero suggesting that the model's predictions were unbiased. The analysis had a standard deviation value of .992 which suggests that the residuals deviate from the predicted values by approximately 0.992 units. A higher standard deviation implies more significant variability or scatter of the residuals around the regression line.

4.9 Research Chart

Table 9 below depicts a bell-shaped histogram which indicated that the distribution of the data followed a normal distribution. Also suggesting that the data was symmetrically distributed around the mean. The frequencies gradually increase, reach a peak at the mean, and then gradually decrease on both sides of the mean. The bell-shaped histogram implies that the data points are evenly distributed around the mean. This suggests that the data was representative of the population and provided a solid foundation for making reliable inferences about the relationship

Table 11 Histogram



between the Digital Era 4.0, youth empowerment, and the achievement of SDGs in Namibia (Table 11).

5 Research Conclusions

5.1 Digital Access and Literacy on Youth Empowerment

According to Svotwa et al. (2023); Ntinda (2022) while over 60 percent of the global population has access to digital financial services hence Namibian youth have varying concerning levels of digital access and digital literacy. While some youth have embraced digital technologies and have access to online resources and opportunities, others face limitations in terms of digital access and skills. This digital divide among youth has implications for their educational, economic, and social opportunities.

The study also highlighted the association between the Digital Era 4.0 and wealth inequality in Namibia that though the economic growth has raised the living level of the world population, income disparity has increased according to several authors (Georgescu & Kinnunen, 2021; Ujakpa et al., 2020; Mhlanga, 2020). The concentration of digital resources and opportunities in the hands of those with access and skills has contributed to wealth inequalities. Marginalized individuals and communities with limited access to digital technologies face increased challenges in benefiting from the digital economy, exacerbating existing wealth inequalities.

5.2 Impact of Digital Era 4.0 on SDGs 4, 8 & 10

Accordingly, in agreement with several authors (Mpofu, 2022; Govindan, 2022) the findings suggest that the Digital Era 4.0 has the potential to contribute to the achievement of SDGs in Namibia. Digital Era 4.0 can be harnessed to enhance access to education, healthcare, and economic opportunities (Mabkhot et al., 2021). And the study concluded that the digital divide and the wealth inequality act as barriers to the realization of SDGs, as marginalized populations face challenges in accessing and utilizing digital resources to their full potential. Overall, the research demonstrates the multifaceted relationship between Digital Era 4.0, youth, wealth inequality, and the achievement of SDGs in Namibia.

5.2.1 Recommendation

The study highlighted the value of addressing the digital divide, promoting digital literacy, and ensuring equitable access to Digital Era 4.0 technologies to harness the full potential of the digital era in promoting inclusive and sustainable development according to the SDGs of Namibia. It recommended to prioritize efforts to enhance digital literacy skills among youth in Namibia. This includes providing access to digital technologies, internet connectivity, and relevant training programs. By equipping youth with digital skills, they can actively participate in the digital economy, engage in online learning, and contribute to the achievement of SDGs.

The study recommends that to increase the scope both in population and cover all SDGs in Namibia. Government to ensure free access to digital infrastructure and internet connectivity across all regions to existing digital divide. MOEAC to integrate digital technologies and digital literacy into the education system at all levels. The study further recommends that the Namibian government and its agencies through their initiatives, developing policies that focus on improving access to quality education, healthcare, career opportunities, and financial resources can help level the playing field and empower young people.

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The Use of Blockchain Technology to Improve Transfer-Pricing Compliance and Administration in South Africa

Mariam Mia, Jurie Wessels, and Saajidah Adam

Abstract The purpose of this study is to determine whether the inherent features of blockchain are suitable for use in easing the transfer-pricing compliance burden of taxpayers and in improving the administration of transfer-pricing for the South African Revenue Service (SARS). The paper considers the benefits, challenges, and practical considerations of using blockchain for transfer-pricing compliance in taxpayer businesses and for streamlining and simplifying the administration and auditing of transfer-pricing cases for SARS. The research took the form of a qualitative study which involved the review of relevant existing literature. An interpretative paradigm was adopted for this study which sought to identify the challenges faced by taxpayers and tax authorities and describe how blockchain technology can assist in remedying these difficulties. A content analysis of various credible sources was conducted in the context of the research objectives. Observations were collated and conclusions were drawn from the study. It was found that blockchain provides numerous benefits for taxpayers in easing compliance for transfer-pricing and other tax types. Blockchain may also be used to simplify other business operations including financial reporting. The technology holds numerous benefits for SARS, particularly for use in administering transactional taxes like transfer-pricing. The study revealed that blockchain is suitable for use in transfer-pricing compliance and administration, with the most suitable type of blockchain being a permissioned consortium platform. Consideration needs to be given to the cost of implementing the technology, training of personnel who will use the platform, the development of governance principles and regulation, as well as the roles and responsibilities of all parties on the network.

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1 Introduction

Globalisation and rapid digital transformation have reshaped the nature and pace of transactions and trade worldwide (OECD, 2019). The prevalence of multi-national enterprises (MNE), e-commerce and foreign investment have birthed multiple forms of business relationships and increased trade avenues. Taxation of modern, technology-based and cross-border transactions have become increasingly complex for revenue authorities and taxpayers (Owens & Hodzic, 2022).

A technology-enabled business environment requires an equivalent and aligned tax system capable of tracking and analysing vast quantities of information in a secure and auditable manner. Tax technology solutions could benefit taxpayers and revenue authorities to optimise their processes and comply with their respective duties and obligations efficiently and cost-effectively.

This is important in jurisdictions where revenue is lost due to adverse tax practices and where revenue authorities are challenged by increasing public scrutiny and decreased budgets.

> In South Africa, a matter of concern has been base erosion and profit shifting (BEPS) or impermissible tax avoidance by MNEs who use transfer-pricing manipulation to shift taxable income to low tax jurisdictions (Wier, 2020) thereby diminishing an already strained tax base.

Various tax experts, revenue authorities and academic scholars have identified blockchain technology as a useful platform for use in the tax arena. According to Dobell (2017), blockchain may improve tax compliance and administration, through:

- increasing transparency of information stored on a platform as it is simultaneously visible to all its users;
- allowing for regular, real-time gathering of information by revenue authorities as opposed to the current periodic collection of historic information which is used and reviewed retroactively; and
- increasing trustworthiness of information which is time-stamped and cryptographically marked to ensure tamper-resistance.

Reliance on inter-company documents and correspondence to define the roles and interactions amongst connected MNE parties can be reduced using smart contracts which are self-executing digital agreements that operate on a blockchain platform (Jurgen, 2018). These features and other attributes of blockchain may benefit both taxpayers and revenue authorities. However, potential challenges and other practical considerations need to be considered.

2 Literature Review

2.1 *Impermissible Tax Avoidance and Evasion*

Individual tax jurisdictions each have their own domestic legislation. The laws of different states interact when international trade occurs (Olivier & Honiball, 2011). Existing bilateral or multilateral agreements between tax jurisdictions merely allocate taxing rights amongst tax authorities and do not align mismatches in domestic tax laws (Herzfeld, 2017). These mismatches present opportunities for international tax avoidance or evasion through BEPS activities (OECD Tax, 2019).

Transfer-pricing refers to the price of products globally traded between connected parties (DTC, 2017). Transfer-pricing has a material effect on tax administrations and taxpayers because a significant portion of taxable income of related parties in various jurisdictions are determined by such prices (OECD, 2017a).

MNEs often facilitate tax-avoidance schemes through unacceptable transfer-pricing practices with transfer mispricing and debt shifting being the most prevalent methods used for tax avoidance (De Mooij & Liu, 2020). This is achieved through arrangements whereby transactions amongst related parties do not occur at values that reflects an arm's length price, which would typically occur between persons transacting independently (DTC, 2017). Resultantly, the 'global' effective tax suffered by an MNE is reduced as income is shifted from where economic activity actually occurs to low or no tax jurisdictions (Richardson, 2019).

2.2 *Countering Harmful Tax Practices*

To combat BEPS practices, the Organization for Economic Co-operation and Development (OECD) published an action plan with guidelines that recommended various amendments to domestic law and international treaties, including information exchange initiatives. Transfer-pricing guidelines are included in action points 8, 9, 10 and 13 of the action plan. Amongst these is a requirement for taxpayers to submit comprehensive transfer-pricing documentation.

South Africa embraced the OECD recommendations and introduced tax legislation requiring, *inter alia,* the reporting of relevant transfer-pricing information as part of the annual income tax returns of certain taxpayers. Requisite documentation includes a 'master file' for each MNE group; 'local files' for each jurisdiction in which the MNE conducts economic activity and annual CBC reporting.

The master file should shed light on the general business of a group including operations; economic activity; the allocation of income within the group; transfer-pricing policies and salient inter-company agreements (OECD, 2017a). Local files augment the master file and describe material 'controlled transactions' amongst associated enterprises including financial information, comparable prices for inter-party transactions and selected transfer-pricing methods. Annual CBC reports should stipulate the business activities conducted by the MNE entity including information detailing the assets, employees, profit, capital structure and taxes paid by the entity (SARS, 2021).

In South Africa, all three reports should be submitted to SARS in terms of Section 25 of the Tax Administration Act No. 28 of 2011 (the TAA). This applies if the taxpayer enters into a potentially affected transaction as defined in Section 31 of the Income Tax Act No. 58 of 1962 (the Act) which exceeds or is expected to exceed R100 million. Submissions must be made online via the eFiling platform (SARS, 2021). Section 29 of the TAA also requires taxpayers to retain records pertaining to their transfer-pricing activities.

The extensive document retention and reporting obligations placed on taxpayers have spawned challenges for both revenue authorities and taxpayers, including:

(i). Exacerbating the compliance burden for taxpayers

Meeting transfer-pricing compliance obligations is onerous on taxpayers as there are large amounts of information involved (Du Toit, 2017).

(ii). The complexity of transactions and the level of expertise and time to identify risks or to audit transfer-pricing transactions.

SARS officials are required to implement and monitor the submission of transfer-pricing documentation and evaluate vast quantities of information received to ascertain their materiality and usefulness for risk assessment and audit purposes.

2.3 Blockchain Technology as a Tax-Technology Solution

A blockchain is a decentralised database or ledger containing information in a ‘chain of blocks’ that are housed in interconnected nodes which store identical information to all other nodes in the related blockchain (Wijaya et al., 2017). A node is a computer or user on a platform that runs the blockchain software. Depending on the type of node, its function is to receive, validate and transfer validated data to other nodes as well as to keep record of the full copy of information in the chain. Mining nodes additionally publish new blocks to the existing blockchain (Yaga et al., 2018). Each block is not a standalone unit but instead contains a cryptographic code of a fixed length called a “hash” which is akin to a unique ‘fingerprint’ of the block. The chain of blocks is sequentially linked to each other as the hash of one block builds on the hash of an immediately preceding block (Berryhill et al., 2018).

Blockchain enables participants to access vast amounts of data simultaneously, in real time, resulting in transparency to all parties involved (Owens & Hodzic, 2022).

The architecture of the blockchain structure renders it tamper-resistant. Blocks are interdependent and any change to one block will disrupt its link to other blocks (Fig. 1). Unauthorised changes will be detected and rejected by the other nodes in the system as the process of consensus will prevent the change from being recognised as valid. Blockchains are further secure as data is encrypted using cryptography that converts it to a format that may only be accessed or read by authorised users

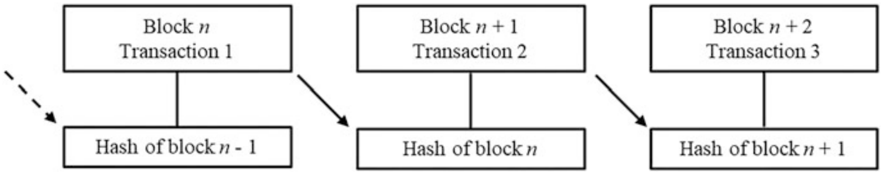

Fig. 1 The interdependence of blocks within a blockchain. Source: Adapted from (Berryhill et al., 2018)

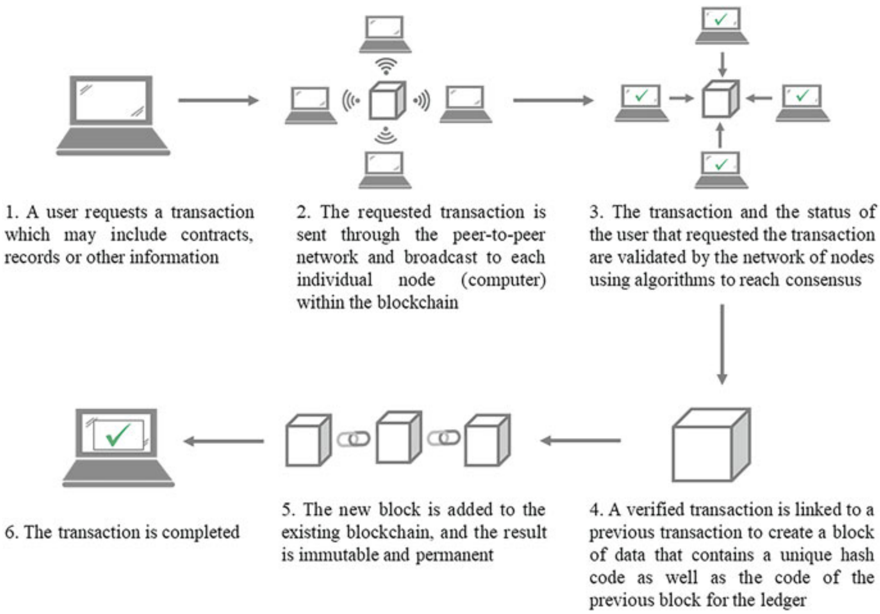

Fig. 2 The process of adding transactions or information to a blockchain. Source: Adapted from (Angraal et al., 2017)

possessing the encryption key or private code. (Yaga et al., 2018). Accordingly, only valid users may access the blockchain and add transactions to a blockchain system (Fig. 2).

2.4 Types of Blockchain Platforms

Blockchain platforms may be structured with degrees of accessibility ranging from public permissionless platforms to private permissioned platforms or a hybrid format that limits specific user rights as required (Akgiary, 2019).

The difference between a permissionless and a permissioned blockchain is like the difference between the internet and an intranet. The former allows open access

		TYPE OF ACCESS				
		Type of blockchain	Read	Write	Commit	Example
Blockchain types	Open	Public permissionless	Open to anyone	Anyone	Anyone	Cryptocurrency
		Public permissioned	Open to anyone	Authorised participants	All or subset of authorised participants	Supply Chain ledger for rental brand viewable by the public
	Closed	**Consortium**	Restricted to an authorised set of participants	Authorised participants	All or subset of authorised participants	Multiple banks operating a shared ledger
		Private permissioned ("enterprise")	Fully private or restricted to limited set of authorised nodes	Network operator only	Network operator only	External bank ledger shared between parent company and subsidiaries

Fig. 3 The main types of blockchain segmented by permission model. Source: Adapted from (Hileman & Rauchs, 2017)

whereas the latter allows for control of the platform through limiting access to trusted parties (Akgiray, 2019). A permissioned platform may be structured to allow only authorised users to access information in the ledger and only specific parties from amongst this group may add information to the blockchain (Akgiray, 2019; Fig. 3).

3 Research Objective

The objective of this study is to determine whether the inherent features of blockchain technology may be applicable and valuable in improving the transfer-pricing compliance and administration process in South Africa. Specifically, the research will explore whether blockchain technology could:

1. aid in ameliorating the transfer-pricing compliance burden on taxpayers regarding collating information, reporting requisite information and completing tax returns; and
2. augment SARS' abilities by streamlining and simplifying the administrative process in a cost-effective manner.

4 Methodology

Research entails a search for knowledge, specifically a scientific and systematic search for pertinent information about a particular topic with the aim of contributing toward and advancing the existing body of knowledge (Kothari, 2004). The manner in which a research problem is systematically solved is referred to as research methodology. This paper takes the form of a qualitative study which, according to Merriam and Tisdell (2016), involves contextually understanding situations and interactions. Qualitative research takes a holistic approach as the matter being investigated is not reduced to its smallest variable. Instead, it is considered in its entirety and maintains the context of the topic being studied (Walker, 1987). This study seeks to understand how the inherent features of blockchain technology may be used to improve transfer-pricing related compliance and administration for taxpayers and revenue authorities respectively. The research topic is considered in a South African context from the perspective of both the taxpayer and the revenue authority.

The concept of understanding is central to the interpretive framework, as the research is guided by their objective of understanding and interpreting the social reality surrounding the topic (Given, 2008). An interpretative paradigm was adopted for this study, which sought to identify the challenges faced by taxpayers and tax authorities and describe how blockchain technology can assist in remedying these difficulties.

Consideration should be given to the trustworthiness and validity of research to ensure that the findings hold true for subsequent readers, scholars and practitioners (Merriam & Tisdell, 2016). This paper employed a review of relevant existing literature. Varied and numerous credible primary and secondary sources of information including, *inter alia,* tax and related legislation; publications from SARS; industry experts; international economic organisations and scholarly articles were collected using electronic databases and internet searches. A content analysis of the collected information was conducted in the context of the research objectives. Observations were collated and conclusions were drawn from the study.

Only information obtained from the public domain and databases to which access has been granted were used and all sources are appropriately cited.

5 Results and Discussion

5.1 Benefits of Blockchain for Taxpayers

Principles of a good taxation system include fairness, certainty, convenience and administrative efficiency which does not impose an unreasonable administrative burden on taxpayers or revenue authorities (Smith, 1776).

Transfer-pricing documentation requirements imposed on taxpayers include annual submissions, requests for additional relevant material when a tax period is placed under review or audit and further document retention obligations (Deloitte, 2017). MNE taxpayers need to comply with requirements that may differ amongst tax jurisdictions, leading to a greater burden and higher compliance costs than for similar entities operating solely within one country (OECD, 2017a).

Blockchain has the potential to ease this burden through decreasing the number of submissions to revenue authorities (EY, 2018). It is proposed that an MNE could adopt a blockchain platform across its various entities and allow tax authorities to access the information contained therein. This could be augmented by machine-learning solutions that use the raw data contained on the platform to populate returns or reports in formats required by SARS.

Blockchain could simplify complex processes and reduce the need for repetitive information submissions amongst parties (Jurgen, 2018) which makes this technology suitable for MNEs with transfer-pricing reposting obligations in various tax jurisdictions.

Before a business invests in new systems or technology, the benefits need to outweigh any potential downsides and the end-result should leave the business in an improved position (KPMG, 2018). If an MNE adopts blockchain technology for record-keeping and reporting purposes, the system must be well designed. According to Gaur (2019), a sustainable blockchain should encompass several design principles, including:

- a secure platform that ensures privacy and control over access to sensitive data.
- scalability and operational efficiency with respect to processing transactions timeously.
- user control of the platform coupled with flexibility to accommodate external parties where relevant and the ability for collective innovation by more than one party when designing or implementing the blockchain.
- the ability to integrate or coexist with other existing systems in a business.

5.1.1 Data Privacy and Access to Information

Enterprises require a solution that offers the ease of information transfer and storage without compromising data privacy. A private or permissioned blockchain is restricted and the owner of the platform can customise user access or rights (Akgiray, 2019). Furthermore, a permissioned blockchain is most suitable for governmental purposes (Ainsworth & Shact, 2016).

A consortium blockchain allows the system owner to customise the type of access granted to different categories of users. If used by an MNE for transfer-pricing compliance purposes, this would allow only authorised users access to a copy of the information in the ledger and only specific parties from amongst this user group may add information to the blockchain. Each individual entity of the MNE in different tax jurisdictions could be given rights to write and commit information about inter-company exchanges on the platform. SARS and other relevant tax authorities could be given limited or read-only access to the ledger, resulting in real-time transparency of information and eliminating the need for tax authorities to request information from taxpayers. Taxpayers would not need to spend time and resources to collect, collate and submit information to revenue authorities either periodically or when under scrutiny.

Public blockchains are more resistant to attack than private networks but private blockchains are more secure than traditional centralised databases and other systems already used by entities (Berryhill et al., 2018).

5.1.2 Data Integrity, Reliability and Corporate Governance

Ainsworth and Shact (2016) describe blockchain as 'trustless' in that it does not require verification from any central authorities or third parties as trust lies in the underlying cryptographic technology. Each transaction request is validated before additions are made to the ledger. Validation is executed automatically without manual intervention (Berryhill et al., 2018). The immutability of a correctly designed and programmed blockchain makes it suitable for use in transfer-pricing tax compliance where information submitted to SARS is vulnerable to manipulation.

A blockchain user only has confidence that data already authenticated and stored on the platform is resistant to manipulation (Tang et al., 2019). The accuracy of the original information shared on the network cannot be assured by blockchain technology itself, therefore measures outside of blockchain are necessary to ensure complete integrity of information. Tang et al. (2019) recommend that ethical considerations are factored into the design and implementation of the technology, including proactive leadership, written governance principles and relevant information technology (IT) internal controls which apply to all parties in the blockchain and the network itself.

5.1.3 Scalability and Operational Efficiency

The process of adding information to a blockchain, as set out in Fig. 2, indicates that transaction requests need to be verified through a consensus method by mining nodes using consensus algorithms before being published as new blocks on the chain (Akgiray, 2019).

The most common algorithms are proof of work (POW), proof of stake (POS) and proof of authority (POA). Each method is automated and requires no manual input from users, thus ensuring the efficiency of the labour aspect of blockchain (Berryhill et al., 2018).

For blockchain to be fit for use by an organisation, it should allow for processing speed, scalability, cost effectiveness and versatility to accommodate or work with other systems. Processing speed depends on the method of consensus used on a blockchain.

The POW algorithm is the most popular method. It involves all nodes on a blockchain attempting to complete a complex algorithm calculation. This consumes vast amounts of electricity, computing power and time (Ainsworth & Shact, 2016), making it unsuitable for transfer pricing compliance and administration purposes as it is not scalable and would be slow, inefficient and expensive to store and share information on a network using this method.

The POA method involves predetermining which nodes will be trusted and granted the authority to create and validate blocks. According to Xu et al. (2018), POA is economical and efficient as it consumes fewer computational resources and uses less time to create new blocks compared to other methods. POA is therefore suitable for the purposes of transfer-pricing compliance and administration as it allows for speedy and cost-effective running of a platform.

5.1.4 Streamlining Compliance for Other Tax Types

Blockchain is particularly useful in making processes around transaction taxes more efficient (Ainsworth & Shact, 2016). Taxpayers could benefit from reducing compliance expenditure and personnel costs as blockchain processes are automated (Berryhill et al., 2018). This reduces reliance on manual work by employees or external service providers to verify or authorise transactions and businesses would need to spend less on employees or tax advisory consultants for compliance or tax dispute purposes.

5.1.5 Accounting and Auditing Application

Daily accounting records of a business can be recorded on a blockchain (Yermack, 2017). The information is time-stamped, secure and immediately visible to stakeholders. Financial statement users do not need to rely on periodic information prepared after a period because data is easily convertible into any financial statement format at any time.

Management accountants would have a view of real-time, reliable financial data. Coupled with machine learning technology this can enhance the analytical ability of businesses and result in more informed decision making.

Blockchain can create a tamper-proof audit trail which facilitates continuous accounting and auditing as opposed to the periodic timing currently prevalent (Rozario & Vasarhelyi, 2018). Smart contracts and auditing analytical tools can be used alongside blockchains to enable auditors to conduct transparent and trustworthy audits and to detect and respond to audit risks. The remaining risk would lie in security breaches; therefore, businesses must ensure that cybersecurity is factored into network design (Ponte & Bednárová, 2019). In 2017, Deloitte conducted a successful blockchain audit by applying International Standards of Auditing (ISAs) on a permissioned network.

5.2 Benefits of Using Blockchain for Transfer-Pricing Administration

Internationally, tax administrations are facing unprecedented change to their tax bases, which are more mobile, global and digitally enabled. Transformative technology platforms, analytical tools and the availability of digital data present opportunities for revenue authorities to use in achieving their revenue collection goals (OECD, 2017b). In South Africa, SARS has invested in tax technology solutions and shown interest in using blockchain to execute its mandate (SARS, 2020). For blockchain to be adopted widely and effectively, there need to be clear advantages to justify investment in the technology for transfer-pricing administration purposes.

SARS is guided by its strategic objectives which are set out in its 2020/2021–2024/2025 Strategic Plan (SARS, 2020) which include *inter alia:*

1. easing taxpayer compliance obligations;
2. detecting and combatting taxpayer non-compliance;
3. expanding data use within a comprehensive knowledge management framework to ensure integrity, derive insight and improve outcomes;
4. modernising SARS systems to provide digital streamlined online services; and
5. effective resource stewardship.

Tax processes including collecting, collating and verifying information, are costly and time consuming due to being labour and paper intensive. Blockchain could modify the relationship between taxpayers and revenue authorities through changing how returns are submitted; how taxes are paid and how information is stored (Jurgen, 2018).

5.2.1 Transparency of Information

Simultaneous, real-time access of information to parties on a blockchain enables monitoring bodies to detect anomalies or unusual activity and makes it easier to view, understand or audit transactions (Wijaya et al., 2017). This should be balanced with data privacy. Chapter 6 of the TAA (2011) places a responsibility on SARS to preserve the confidentiality of information obtained from taxpayers. Use of a private consortium blockchain which grants read-only access to SARS would protect taxpayer information without compromising access to information.

5.2.2 Compliance Simplification and Certainty for Taxpayers

Tax administrations are working toward providing more streamlined approaches to compliance, including embedding tax processes into daily processes and applications of businesses (OECD, 2017b). Blockchain may be used to integrate tax compliance with simply conducting transactions, thereby reducing costs and removing many classic opportunities taxpayers would otherwise have had for non-compliance (Owens & de Jong, 2017).

Tax legislation regulates the information required for submission to tax authorities but does not always standardise the process or information presentation format. Businesses use various interfaces, including paper-based exchanges and email communication. This lack of standardisation is a hindrance to digitisation and automation of processes and is often prone to compliance violations by taxpayers (Fatz et al., 2019). Revenue authorities cannot regard blockchain alone as a solution to easing compliance. Rather, a holistic effort comprising of standardising processes; providing guidelines to taxpayers; and using blockchain to enable these changes is required.

Taxpayers who adopt blockchain for transfer-pricing compliance purposes would essentially publish their inter-company transactions on the network. This is useful to tax authorities whose current challenge lies in having limited visibility of business activities of taxpayers (Fatz et al., 2019), gaps in information and delays in obtaining necessary data both routinely and on request during audits or investigations.

MNEs with a total consolidated group revenue exceeding R10 billion or EUR750 million are obligated to submit annual reports outlining inter-company transactions (SARS, 2021). This threshold could be vulnerable to tax avoidance schemes carried out by MNEs falling below the threshold because periodic detailed submissions are not required from these entities and their avoidance activities may go undetected by revenue authorities. Use of a blockchain platform may mitigate this concern since all transactions amongst related MNE parties are included on the blockchain, regardless of the size of the MNE or transaction. Consideration needs to be given to whether all MNEs should be required to adopt a blockchain platform, and if so, who will be responsible for developing and funding the technology.

SARS presently requires periodic returns to be submitted or updated annually within 12 months after the end of the financial year-end of the MNE. The earliest time SARS obtains information about inter-company transactions is a year after transactions have occurred. The SARS external guide relating to CBC reporting sets out specific submission requirements which need to be validated before a submission is accepted (SARS, 2021). This may lead to frustrating and time-consuming delays in information being accepted by SARS and unnecessary back and forth correspondence between taxpayers and SARS relating to formatting requirements. Use of a blockchain would always grant SARS real-time access to information, effectively reducing the administrative burden of requesting information and resulting in speedier risk assessment and detection of non-compliance.

5.2.3 Taxpayer Non-compliance and Audits

Tax audits form part of SARS' mandate. These processes consume time and labour and could benefit from being automated to provide SARS with real-time information that is digitally verified or authenticated. Demirhan (2019) defines auditing as the examination of transactions and accounts of taxpayers that are related to taxable events. This is done by tax officials with the objective of extending the tax base and minimising the compliance gap.

Current tax audit approaches are heavily rule-based, undertaken after a tax period has ended and reliant on taxpayers to provide information through submissions which may be prone to errors or misreporting (OECD, 2017b). Regarding MNE entities, the relationship amongst these connected parties may create opportunities for non-compliant behaviour that is inconsistent with practices or transactions contained in agreements submitted to revenue authorities. Traditionally, transactions amongst related parties are set out in non-digital intra-firm agreements which bear a high risk of falsification or tampering. The use of smart contacts may provide assurance to tax administrations as the terms and conditions coded therein are automatically executed and easily verifiable (Demirhan, 2019).

Although blockchain provides confidence in the integrity of information contained on a platform, auditors still need to assess the correctness of application of legislative requirements. Transfer-pricing audit cases are fact-specific and require complex evaluations of comparable information, different markets and other information. These cases require specialised officials, more time and different approaches compared to auditing other tax types (OECD, 2017a). Wier (2020) suggests using digital interventions, including an automated flagging system to capitalise on raw data that SARS already has access to and using this information to test for deviations from correctly applied pricing principles. Coupling blockchain with advanced analytical techniques may make this risk management intervention possible.

5.2.4 Collaborative Efforts with Other Revenue Authorities

Collaborative efforts amongst revenue authorities to address international tax evasion and avoidance through complex schemes and arrangements include sharing information and tax rulings, updating treaties and joint audits (OECD, 2017b). Mutual assistance in investigations is useful when information is required from different countries. It may reduce compliance costs, speed up the resolution of tax disputes and provide insights into MNE activities, thereby enabling tax authorities to make better informed decisions about administration and risk management (OECD, 2017a). Joint audits may be conducted on blockchains which enable peer-to-peer data management between revenue authorities (Owens & Hodzic, 2022). These audits may involve auditors of each state separately conducting examinations according to provisions of their domestic laws while sharing information and other relevant support within the framework of international agreements that ensure that relevant safeguards are kept in place (OECD, 2017a).

Although useful, facilitation of mutual assistance may be challenging for tax authorities where taxpayers are unwilling to cooperate or if there are delays in providing information (OECD, 2017a). Revenue authorities of different states have separate secure databases which makes information sharing cumbersome and slow. A shift to the use of decentralised blockchains may remedy this challenge.

5.2.5 Data Management and Advanced Analytics

Tax administrations possess a wealth of data obtained through returns, third party submissions and withholding agents. The use of a blockchain platform to securely collect and store information, paired with big data technology, could enable revenue authorities to unlock value from raw unstructured data, which can be analysed using advanced analytics. SARS has partnered with state-owned enterprises to conduct a proof-of-concept study to determine the feasibility of using blockchain with advanced analytical technologies.

Advanced analytics involves application of statistical and machine learning techniques to data with the aim of identifying trends, patterns, or insights from information which can be used to make informed decisions about how to efficiently deploy resources (OECD, 2016). Comparisons can be drawn across multiple periods and jurisdictions enabling tax authorities to have a have a broader understanding of taxpayers and accordingly tailor their interaction with taxpayers, service them more effectively and improve enforcement activities which reduces costs and increases taxpayer satisfaction (OECD, 2016).

Information gathered from CBC reports will provide revenue administrations with data for transfer-pricing risk assessments and aid in transfer-pricing case selection. This would reduce the number of cases incorrectly flagged for intervention, effectively saving auditors' time and decreasing the burden on compliant taxpayers (OECD, 2016). Advanced data analytics has already been used in certain tax jurisdictions including Canada which has an automated system that ranks taxpayers by risk using algorithms to focus audit resources on high-risk cases of non-compliance (OECD, 2017b).

5.2.6 Effective Resource Stewardship

SARS could extend the use of blockchain to various tax types including payroll tax, VAT, customs, and transfer-pricing (Owens & Hodzic, 2022). Effective resource stewardship extends beyond creating value and attaining quality performance, to improving accountability and internal controls within SARS (SARS, 2020). Blockchain may aid in this regard by providing transparency of government data and transactions (Berryhill et al., 2018) if SARS introduced blockchain for its own operating and reporting purposes.

5.3 Challenges and Practical Considerations Relating to the Adoption and Implementation of Blockchain

Although there are numerous benefits associated with adopting blockchain for use in transfer-pricing matters for taxpayers and SARS, there are challenges and practical considerations relating to the introduction and implementation of the technology including*:*

– the cost of introducing and maintaining a blockchain platform;
– the owner or party responsible for the network;
– blockchain governance;
– training of personnel who will use the technology; and
– interoperability of the blockchain with existing business and other systems.

5.3.1 The Cost of Blockchain and the Owner Responsible for the Technology

While blockchains may result in cost savings in a business relating to processing transactions and storing information (Jurgen, 2018), introducing blockchain would require an initial capital investment by parties seeking to adopt the technology. Implementation costs include integrating a blockchain with existing systems and equipping personnel within an organisation to use the platform.

Entities may form partnerships to share the costs of developing blockchain infrastructure. This introduces the challenge of aligning the system to suit the needs and interests of different parties (IFC, 2019). Multi-party involvement in development of a blockchain may result in a lack of accountability if there are insufficient, explicitly defined responsibilities. This could result in ethical issues pertaining to sustainability, fairness and privacy as well as cause software errors in the platform (Tang et al., 2019). If an entity opts to develop a network in conjunction with other parties, the roles, mandates and powers of each party should be established and communicated upfront.

The cost saving potential of blockchain must be balanced with the costs necessary to develop, introduce, maintain and run a platform. The running costs and return on investing in blockchain is not yet clear (Berryhill et al., 2018) which may make it challenging to justify its adoption. It is likely that blockchain will gradually be adopted over several years and if widely embraced, this could achieve economies of scale. Solutions where blockchain is offered as a service by external parties may make experimentation quicker, easier and less risky (Berryhill et al., 2018).

As a recommendation for making blockchain more accessible to small businesses and to make investing in technology more appealing to larger entities, SARS could consider making some software available to taxpayers or granting tax incentives for blockchain use in tax compliance. SARS would also need to publish guidelines relating to how the revenue authority and taxpayers interact on blockchains.

5.3.2 Ownership and Management of Blockchain Networks

Consideration needs to be given to setup followed by continued maintenance and control over the platform, including dispute resolution, rules and permissions for users, software updates and protection against system failures or cyber-attacks (Akgiray, 2019). It is recommended that taxpayers control their own platforms including facilitating access of each user and reporting their transactions on the network for revenue authorities to observe. This approach ensures that taxpayers are in control of their own business systems and does not create additional administrative duties or tasks for SARS.

Use of new or complex technology may increase reliance on technical expertise of private parties tasked with coding and developing a network (Owens & de Jong, 2017). Coders and engineers who build blockchains serve as the *de facto* central authority over networks because their actions and decisions are coded into the systems they create (Berryhill et al., 2018). Taxpayers and SARS should familiarise themselves with the technology to ensure that even they are able to determine whether the product is appropriately developed and further able to assume responsibility for the platform (Berryhill et al., 2018). This is also necessary to ensure the integrity of information added to the blockchain.

Blockchain managers should ensure that their platforms regularly undergo software maintenance and upgrades to prevent issues or bugs in their systems and should have contingency plans in place to cater for any unexpected eventualities or system failures (Hileman & Rauchs, 2017).

5.3.3 Interoperability of the Blockchain with Existing Business Systems

Ideally, new technology should be able to integrate and operate with legacy systems used in an MNE. The IFC (2019) recommends that common standards for interoperability are necessary to establish collaboration with and benefit from blockchain. Interoperability in a blockchain typically fits within two categories: firstly, cross-chain interoperability which relates to the ability to link different distributed ledgers and transfer information and value amongst them and secondly, enterprise system integration which deals with connections and interactions between blockchains and other types of applications or systems in a business (Hileman & Rauchs, 2017). There are currently no clear standards for developing blockchains with protocols that would ensure compatibility with other networks. Solutions are being considered, for example application programming interfaces, which facilitate the transmission of data between different types of software, and middleware, which is placed between an operating system and applications on the system to enable communication amongst separate or distributed systems (Hileman & Rauchs, 2017).

Blockchains are not designed for general storage of various media such as multiple documents, images, videos and applications. Where this type of information needs to be stored, it is possible to use a hybrid system and store information off the blockchain itself and link the data to a block transaction (Yaga et al., 2018). Blockchain is a suitable in instances where users require a platform to maintain a trustworthy, distributed record of transactions (Berryhill et al., 2018). This makes it fitting for transfer-pricing tax compliance since the primary requirement is to store and share information about intercompany transactions.

5.3.4 Governance and Regulation of Blockchain

A decision to adopt blockchain should be informed by understanding how the technology operates, including its limitations and suitability (Owens & de Jong, 2017). Blockchain is a technology with global application, similar to telecommunications and the internet for which there has historically been collaborative international effort (Owens & de Jong, 2017). To eliminate confusion, standardisation surrounding blockchain should cover terminology, architecture, and governance. Clear guidance relating to design, data storage protocols, access rights, consensus mechanisms and smart contract capabilities will ensure that networks are easy to supervise, govern and audit (Akgiray, 2019).

The International Organisation for Standards has established a technical committee, mandated with standardising distributed ledger technology so that it can support the interoperability of data exchanges amongst users, systems, and applications (ISO, 2020).

Although there is development relating to regulation internationally, the regulatory environment is complex and lacks certainty. There are various approaches taken by parties interested in the technology. According to Akgiray (2019), these include:

– A cautious study, wait and see approach which avoids the introduction of hasty regulation but deters testing new models for fear of conducting unregulated activities.
– Early enactment of new legislation and regulations which may inadvertently cause legal confusion and require numerous amendments.
– A sandboxing approach that provides regulatory guidance on how blockchain can fit into existing legal frameworks and fosters a legally conducive environment for developers to test their projects on a limited scale, for a specific period, or under supervision.

South Africa should adopt the balanced sandboxing approach to foster testing and innovation of blockchain in the tax arena and where possible, collaborate with other states to share insights and experiences. If blockchain is introduced for transfer-pricing purposes, SARS should publish detailed guidance for taxpayers, covering the rights, roles and responsibilities of each party involved. This would be in line with SARS' strategic objective of providing clarity and certainty to taxpayers using instruments already available to SARS including rulings, interpretation notes and explanatory guides (SARS, 2020).

5.3.5 Training and Equipping Employees to Use Blockchain

A general challenge faced by tax administrations pertains to human resources and budget constraints. According to Wang (2020), a significant challenge relating to applying blockchain in the collection and management of taxes is the lack of suitably skilled employees with expertise in both taxation and technology. SARS typically does not receive or provide advanced training in IT, coding, programming, and cryptography. This means that tax officials would be unable to read or understand the technical aspects of blockchains and unable to verify the appropriateness, completeness, or accuracy of blockchain networks for tax administration and audit purposes (Owens & de Jong, 2017). It is recommended that SARS invests in upskilling its employees to keep pace with new technologies introduced as this will result in more efficient operational capacity at SARS. This also aligns with its strategic objective of having a diverse and agile workforce (SARS, 2020).

6 Conclusion

The principal research objective of this study is to determine whether blockchain technology may be applicable and valuable in improving transfer-pricing compliance and administration in South Africa.

The study's findings indicate that blockchain presents numerous benefits for taxpayers and SARS. The most suitable type of blockchain for use in transfer-pricing matters is a private consortium blockchain which runs the POA consensus algorithm to validate changes made on the platform. Taxpayers should have control over the access rights and content on the blockchain and the taxpayer would grant relevant tax administrations read-only access to a network. Published information should include inter-company transactions concluded amongst the related MNE parties.

6.1 Benefits of Blockchain for Transfer-Pricing Taxpayers

The first sub-objective considered whether blockchain could aid in ameliorating the transfer-pricing compliance burden on taxpayers with regard to collating information, reporting requisite information and completing tax returns. The study met this objective and found that blockchain holds numerous benefits for taxpayers, specifically the ability to reduce the submission of transfer-pricing returns and reports to SARS and other revenue authorities. Information already published on platform by MNE taxpayers can be shared easily with parties granted access rights to the network by the taxpayer. This reduces the overall time and resources spent on compliance activities. Taxpayers would have a secure record of their operations which allows for improved certainty in their own tax management as well as enhanced analytical ability within the business to facilitate more informed decision-making by management for other business purposes.

6.2 Benefits of Blockchain for SARS

The second sub-objective considered whether blockchain could augment SARS' abilities by streamlining and simplifying the administrative process in a cost-effective manner. The study met this objective and found that there are multiple uses and benefits for using blockchain in relation to transfer-pricing for SARS.

SARS would have access to a comprehensive record of tax information including transactions, ownership rights, transfers and capital transactions amongst related parties in real or near real-time. SARS would have enhanced confidence in the integrity of information reported on the blockchain if smart contracts are used to automate transactions between related parties.

Further benefit can be derived from blockchain if its use is extended to administration of other transactional taxes, collaborative efforts with other revenue authorities and if the technology is coupled with different tax technology solutions like advanced analytics.

6.3 Recommendations and Areas for Future Research

The development and maintenance of a suitable blockchain platform and training of staff to use the technology would be costly. It is recommended that government provides taxpayers with support in implementing blockchain through tax incentives. Alternatively, SARS may invest in the development of the technology and make this available to taxpayers. It is further recommended that National Treasury publishes legislation supplemented by SARS' guidance to dictate the roles and responsibilities of taxpayers and SARS in relation to the technology and how it is used.

There is presently a lack of consistent regulation surrounding blockchain which creates uncertainty for parties interested in pursuing the technology. Future research relating to the governance and regulation of the technology is needed.

Implementation of blockchain should ideally be undertaken as a collaborative project interested parties to ensure the needs of all users are factored into the design and adoption of the technology. Taxpayers and SARS should work together and take a proactive approach in constantly evolving their capabilities and operations to keep abreast of economic and technological developments in the tax environment.

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Insider Threats to Cyber Security in an Audit Environment

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Abstract There has been a notable increase in insider threats to information security (IS) globally. South African entities have thus not been spared, and the challenges relating to insider information security threats affect firms of all sizes and in all industries. It therefore follows that audit firms are not immune, as these rely on the trust given to them by their clients to keep their information secure. This is therefore a growing problem that has not spared entities in South Africa. The current study sought to evaluate the level of awareness and measures to safeguard client information from cyber related risks that emanate from within. The study employed a positivist research philosophy and a descriptive survey which focused on small to medium audit firms. A questionnaire was used for collecting data, which were analysed using descriptive statistical analysis. Findings showed that there was generally a high level of awareness amongst staff in the firms studied. Most firms have implemented suitable and relevant measures to safeguard client data electronically stored and or transmitted. Results also showed that most of the best practices utilised globally have been adopted in the audit firms under study. These include secure access methods like Virtual Private Network (VPN), internal firewalls, USB port locking, hard drive and memory stick encryption and the use of strong passwords. It was recommended that regulators and policy makers strive to provide the necessary guidance concerning client information security optimisation amongst audit firms, thus standardising this aspect and encouraging the adoption of best practices.

Keywords Cyber security · Insider threat · Awareness · Information security

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1 Introduction

Information is a critical asset in the efficient application and management of firm resources, and safeguarding this information remains a top priority for organisations globally (Rosati et al., 2019). Solms (2021) notes that cybercrime in South Africa has resulted in annual losses of up to R2.2 billion. Similarly, the South African Banking Risk Information Centre (SABRIC) (2021) reported that South Africa loses R2.4 billion to cyber-attacks annually. These entities included government agencies, medical institutions, financial institutions, and corporate institutions. Challenges relating to abuse of access privileges by internal users were one of the most prevalent forms of cyber security issues (Fagerström, 2013). Similarly, the prevalence of insider attacks is emphasised by Upton and Creese (2014) who state that there is an enormous number of about 80 million insider attacks in the United States that are happening annually, which number is likely higher as a lot of those attacks go unreported and undisclosed to protect organisation's reputations. The Audit Analytics Cyber Security Reports (2020) states that in most cases audit firms do not disclose the form of cyber-attack or the actual extent of data breaches to prevent reputational damage.

Audit firms are not immune to cyber security threats. This is more so given that audit firms' business is predicated on information collected, processed and stored. Thus, like any other organisations, audit firms face cyber security risk. The negative effects of cyber security breaches at both firm and market level are well documented (Spanos & Angelis, 2016; Rosati et al., 2017; Kamiya et al., 2018). Cyber security issues in audit firms are a typical case of issues that affect external stakeholders in the form of clients whose data is at risk (Hovav & Gray, 2014). However, little has been done by way of research of cyber security issues in small and medium audit firms, more so focusing on internal threats.

2 Literature Review

Existing literature on Information Security (IS) and related threats shows that information is an important resource in an organisation; therefore, safeguarding this information remains a top priority for organisations globally. This is more so given to the noted increase in the prevalence of IS threats globally. The upsurge in these threats and attacks is a great concern for entities in South Africa and abroad (Cheng et al., 2019). Despite notably little literature on audit firms and the problem of insider threats, it makes sense that they may not have been spared particularly given that they are entrusted with large volumes of client data. It is therefore important that the existing literature and knowledge on insider threats to IS reviewed to gain insights on what other writers have put forward on the subject matter. In the same vein, reviewing literature is important in locating the current study on audit firms within the current discourse on insider threats.

The term cyber security has attracted great interest in both academia and practice. This may explain the broad use of the terms as well as the variations in definitions attached to it. Cyber security has gained prominence as an information technology (IT) risk. However, it is only recently that such breaches and attacks have drawn great attention from both academics and practitioners. The Ponemon Institute (2017) reports that cyber-crime costs US$11.7 million per firm on average and that there have been a 27.4% increase in security breaches globally.

The definitions utilised in extant literature are context-bound, sometimes uninformative, and often subjective. There is thus no universally accepted definition of cyber security in extant literature. Seemma et al. (2018) define cyber security as the organisation of processes, resources, and structures utilised in protecting cyberspace and cyberspace-based systems. The definition is highly vague, leaving out important aspects which are better specifically mentioned. Canongia and Mandarino (2014) define cyber security as the art of ensuring the continuity and existence of the information society of a nation, protecting and guaranteeing its information, assets, and critical infrastructure in cyberspace. The definition demonstrates a higher order orientation by focusing on a nation as opposed to the lower order units like firms.

This study adopts the definition by Public Safety Canada (2014), which defines cybersecurity as the body of technologies, practices, processes and response and mitigation measures that are designed to protect computers, programs, networks and data from damage, attack or unauthorised access with a view to ensure integrity, confidentiality and availability. This definition is comprehensive, unifying and meaningful, and encapsulates all the important elements of cyber security. The emphasis of cyber security has historically been on servers, data, networks, services, and data processes. The user has however become the weakest link in recent times in the cyber security chain. This has manifested as privileged account misuse by individuals to whom access is granted. It is therefore important to place increased focus on the user behaviour analytics over a given set of cyber assets including aspects like encryption, access management, identity management as well as artificial intelligence use (Dunn & Egloff, 2016).

The nature of business globally has been altered by the propagation of network-based communications. This has brought an unprecedented level of vulnerabilities and threats to information systems within businesses. IS theories show that within modern business, internal employee behaviour can cause serious damage to information systems (Cooper et al., 2017). Aytes and Connolly's (2003) user behaviour model places emphasis on user perception of choice as well as risk, indicating that internal employee behaviour in the context of IS results from choices that they make. The implications of such behaviours are however sometimes organisation wide.

In recent times, there has been an increased dependence on entities on information as well as computing systems which they have used to anchor their business processes and activities including strategic planning. However, ISA came with the need to ensure that data and information are secure (Brodin, 2019). This is important in the context of the current study given that when a firm loses client information or control over the same, it suffers a loss of trust amongst its customers (Peters et al., 2017).

The balanced security controls approach has been widely accepted as a standard in the management of IS. There has been emphasis on technical solutions, and these have been identified at operational level in the context of IS and cyber security (Singh, 2013). Earlier research studies dominated by computer scientists like Jemal (2014); Kabanda (2018); and Khan (2019) focused on the development and configuration of technical security countermeasures with a view to improving protection and detection at operational level.

Literature on the trends in cyber-attacks and data breaches in organisations was also reviewed, and it is clear that cases have been on the rise and there has been great interest in academia and industry shown by the large amount of literature on these breaches. Furthermore, it has been considered in past studies though most of the literature is generic and falls short of analysing ISP in the context of audit firms.

3 Research Problem

There has been a spike in insider threats to data and IS globally. South Africa has not been spared as the problem has reared its ugly head, with local entities facing huge losses. The Cost of Insider Threats: Global Report conducted by the Ponemon Institute (2017) states that insider threat incidents have risen by 44% over the past 2 years, with the cost per incident up by more than a third to $15.38 million. More specifically Hurwitz (2020) demonstrates that 10% of surveyed entities have suffered financial losses due to insider IS threats. Equally, PwC (2021) reports an upsurge in insider information attacks amongst South African entities. South African entities have thus not been spared the challenges relating to insider IS threats. This is therefore a growing problem that has not spared entities in South Africa.

Accounting firms of all sizes rely on the trust given to them by their clients to keep their information secure. Firms are at a high risk of targeted data attacks because of valuable and sensitive data that they process, collaborate, and store. With the current wave of cyber related attacks, it is imperative for audit firms to ensure the Confidentiality Integrity and Availability (CIA) of client data as the improper handling of such information has serious repercussions to the audit firm and the client being audited. The audit profession has been under immense scrutiny because of several adverse findings against some major role players in the industry. Any issue or incident caused by an employee could cause an irreparable harm to the profession and the organisation.

4 Research Objectives

The objectives of this study were to:

i. Determine the level of awareness among small to medium audit firms' trainees and auditors in respect of cyber related risk to client's confidential information that they handle or transmit during and after audit engagements;
ii. Critically evaluate the perceptions on relevance and effectiveness of measures or strategies being utilised in these firms to safeguard electronically stored and transmitted client data; and
iii. Assess the measures implemented in small to medium audit firms against widely accepted industry standards and frameworks.

5 Research Methodology

The study is a descriptive study that utilised quantitative research methods to allow the researcher to reach a desired requirement of the study (Johnson, 2016). The study population included employees at all levels of small to medium audit firms in South Africa. A sample was selected using convenient sampling and this was meant to address access issues that could hinder progress in data collection. A questionnaire was used in collecting data to ensure the validity of findings. Descriptive statistical analysis and content analysis using Statistical Package for Social Science (SPSS) software were used in carrying out data analysis. The findings of the study were presented through tables.

6 Research Philosophy

There are two main research philosophies, namely the positivist and the interpretivist. The former sees a researcher assumes the role of a neutral and objective analyst (Ryan, 2018). A researcher thus makes detached interpretations regarding collected research data. Then, the interpretivist philosophy views reality as a social construct and, as such, there may be different interpretations attached to the same philosophy depending on people's experiences and beliefs (Ryan, 2018). Thus, people make sense of their environment through interpretation and meaning. The current study adopted a positivist research philosophy in which the researcher adopted the role of an independent analyst. This allowed the researcher to address all the stated objectives of the study. This philosophy sets the stage for usage of quantitative-method research paradigm in addressing the stated questions.

7 Research Design

Research design is commonly used when a study seeks to give a full description of the behaviour, problem or concept in its natural setting. The study undertakes a descriptive survey research design. A research design offers a framework which stipulates the kind of data that is to be collected, data collection procedure as well as data sources (Churchill & Lacobucci, 2005; Ramirez, 2017). The same was viewed as being the most appropriate in the current study as it allowed the researcher to acquire a great deal of information regarding the IS breaches by insiders. Furthermore, the design allowed the researcher leeway to analyse data provided by the research participants regarding the problem under study. According to Mugenda and Mugenda (2003), such research aims to give a description of the way things really are and such a research study provides a clear picture of the study population's status. The design was opted for as it allowed the researcher to make use of quantitative methods. In the same vein, the design allowed the researcher to gain a full and clear understanding of IS issues under study in the context of audit firms.

8 Research Approach

There are basically two main research approaches, and these are the deductive and inductive approaches. The former aims to explain causal relationships between variables and involves the development of hypotheses that are tested through gathering of primary data (Woiceshyn & Daellenbach, 2018). Such concepts must be operationalised in a manner that permits measurement to be done quantitatively. The latter places emphasis on collection of qualitative data. In this case, theory follows data. It is thus highly subjective from the perspective of the researcher, which may pose reliability challenges (Mwangi, 2017). The current study adopted a deductive research approach. This set the stage for the use of quantitative-methods research. This is opted for as it stresses numerical analysis as well as objectivity, replication and reliability. The study focused on factors influencing organisational commitment, which brings in a causal dimension.

9 Target Population

Target population relates to the totality of elements, cases or individuals that have a common trait that is of interest to a given study. The current study targeted small to medium audit firms in South Africa. Small to medium sized firms were opted for given that there has been a shift in the market in which big corporates now also engage the services of smaller to medium sized firms which are not part of the traditional 'big four' firms.

The sampling frame was limited to small and medium sized firms in South Africa. The study selected a sample of firms from the identified frame. Respondents were then selected randomly as the questionnaire was distributed to firms through training officers as a way of reaching all employee levels.

10 Research Instruments

The researcher employed a structured questionnaire in collecting data in the current study. This form of questionnaire was used for all the selected research participants. A questionnaire can be understood to be a specially designed form containing questions to which a participant should provide responses. A structured questionnaire contains both close-ended and open-ended questions. The current study utilised a likert scale questionnaire that had five sections. The first section contained questions on participants' and firms' profiles. The subsequent sections contained questions that addressed the stated research questions. Furthermore, each section contained a question with a 5-point scale (1 = Strongly disagree; 5 = Strongly agree). Each of the constructs carried propositions and assertions based on the literature reviewed. The propositions were drawn from literature on each of the research objectives. The questionnaire was opted for given that it is relatively less time consuming and cost effective. Furthermore, it is a widely used data collection instrument that is robust and straight-forward. The researcher also wanted to ensure that respondents could respond to questions when it was convenient for them to do so. Furthermore, the researcher was in a position to collect sufficient data from various locations without necessarily being there physically. Teddlie and Tashakkori (2004) indicate that the instrument allows a researcher to collect a lot of data in the shortest possible time. The structured questionnaire also helped ensure focus was maintained by limiting the scope of the data that could be provided while at the same time allowing respondents a little room to manoeuvre.

11 Ethical Considerations

The following steps were taken to ensure adherence with ethical principles in research:

- The researcher ensured that all respondents made conscious and informed decisions regarding their participation in the study. This was ensured through full disclosure of material facts about the study as well as the condition under which they would participate in the study.
- No respondent was coerced into participating in the study.

- The researcher treated all the collected data with utmost confidentiality and data were kept in a safe throughout the duration of the study. No data were divulged to any third party without the express consent of all the respondents.
- No visible connection was kept between the data collected and the individuals from whom the data were collected. This was in line with the undertaking to ensure anonymity of the participants.

12 Data Analysis and Presentation Tools

This relates to the work that is undertaken on research data to give it meaning and structure. Thus, this process may involve breaking down the data, organising it, capturing it as well as searching for meaning and patterns that address the stated research questions (Bogdan & Biklen, 2003). In the current study, the researcher utilised descriptive statistical analysis in analysing collected data. Descriptive statistics allowed the researcher to effectively summarise large volumes of data and analyse and present it effectively. The researcher presents findings using tables and this was opted for because they serve as visual aids to enhance the understanding by the audience. The main data analysis tool was SPSS.

13 Data Presentation and Analysis

Based on the below, 152 of the 160 that the researcher distributed were returned. However, 3 of these were unusable as they had missing data leaving the researcher with 149 fully usable instruments. The response rate was thus 93.1%. This is a high response rate, which means that the study was completed based on sufficient data collected from the identified and included individual auditors (Table 1).

Table 1 Response rate

Instrument	Distributed	Returned	Unusable	Response rate based on all returned (%)	Response rate based on usable questionnaires (%)
Structured questionnaire	160	152	3	95	93.1
Total	160	152	3	95	93.1

Source: Primary data

14 Respondent Profiles

The researcher sought to elicit certain relevant information about the respondents. This information was deemed relevant to the study and respondents were required to provide indications relating to the same. The researcher sought to determine the designation of the respondents in the study. Pursuant to this, each respondent was required to indicate their designation in their organisation. This was important in ascertaining whether the study achieved some balance regarding the distribution of individuals according to designations, which was estimated to lend credence to the findings of the study. Results are shown in Table 2 below.

Based on the results in the table above, 71.1% of the respondents were trainees while another 23.5% were managers. The remaining 5.4% were executives within their respective firms. This means that the study was able to cover all designations with regards to auditors included in the study. On the other hand, the researcher asked respondents to indicate the department in which they served. This was also important in assessing whether balance was achieved in this regard. Results are shown in Table 3 below.

Results indicate that 63.1% of the respondents served in the audit department while another 26.2% served in the Tax department. The remainder (10.7%) served in the.

IT audit department. The results thus show that all the departments of interest were covered in terms of sample selection. This is important in ensuring that any departmental differences are fully reflected in the findings of the study.

Table 2 Respondent designation

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Trainee	106	71.1	71.1	71.1
	Management	35	23.5	23.5	94.6
	Executive	8	5.4	5.4	100.0
	Total	149	100.0	100.0	

Source: Primary data

Table 3 Respondents' department

		Frequency	Percent	Valid percent	Cumulative percent
	Audit	94	63.1	63.1	63.1
	Tax	39	26.2	26.2	89.3
	IT audit	16	10.7	10.7	100.0
	Total	149	100.0	100.0	

Source: Primary data

15 Level of Awareness among Small to Medium Audit Firms' Trainees and Auditors in Respect of Cyber Related Risk to Confidential Client Information

This was the first stated objective of the study. It relates to the level of awareness of both auditors and trainees concerning the cybersecurity risks to client data. To address this objective, the research made some propositions based on literature reviewed. Respondents were expected to indicate the extent to which they agreed with the propositions on a 5-point Likert scale. A mean score of 3.5 and above signalled at least an agreement whilst a mean of between 2.6 and 3.4 signalled uncertainty. A means response of between 1 and 2.4 signalled at least a disagreement. The maximum response on the Likert scale and the minimum received are also included in the results presented in Table 4 below.

Results indicate that respondents had full knowledge of firm ISPs. This was the view shared by most of the respondents in the study, and the mean response of 3.94 indicates that most of the respondents were at least in agreement with the proposition by the researcher. The standard deviation for this item was 0.799, which is low. The low standard deviation indicates low variability of responses and high reliability of the mean. The high degree of awareness in this regard may be attributable to the efforts that firms make in a bid to ensure that there is awareness amongst employees.

Table 4 Level of awareness amounts trainees and auditors in medium-sized audit firms

	Responses	Minimum	Maximum	Mean	Std deviation
I have full knowledge of the firm's information security policy(s)	149	1	5	3.94	.799
I am able to identify phishing emails or links and always avoid or delete them.	149	2	5	4.44	.701
I am interested in the firm's information security and I am aware of the various cybersecurity risks and threats	149	1	5	4.02	.809
As an employee I am aware that client's information should always be kept confidential	149	1	5	4.89	.445
There is no problem with discussing audit matters when out with friends or using public transport.	149	1	5	1.39	.860
Client's information should never be shared with anyone who is not part of that particular task.	149	1	5	4.45	.926
Pop up messages whilst online are good as I do not miss out on specials.	149	1	5	1.60	.855

Source: Primary data

The study results also show that most of the respondents indicated that they were in a position to identify phishing emails or links and always avoided or deleted them. A mean score of 4.44 was recorded for this item while the standard deviation was 0.701. The mean score indicates that most of the respondents agreed with the researcher's statement while the standard deviation indicates that the mean score was highly reliable, and responses were not varied.

Most of the respondents were interested in the firm's IS and they were aware of the various cyber security risks and threats. Most of the respondents shared this view as indicated by a 4.02 means response, with a low standard deviation of 0.809. The buy-in of individuals in a firm is important in the IS context. Where employees are interested in the security of client information, they may be more receptive of information meant to create awareness regarding the same and readier to comply with requirements in the same context.

A huge number of respondents in the study were also aware that client information should always be kept confidential (mean = 4.89; SD = 0.445). Most of the respondents thus understood the importance of ensuring that client information is kept confidential, which necessitates optimisation of IS within their respective audit firms. This understanding may inform the behaviours of those involved and therefore aid firms' efforts to ensure IS. Conversely, lack of such understanding may see individuals engaging in reckless behaviour thereby exposing firms to serious risk of IS breaches.

Many respondents found discussing audit matters when out with friends or using public transport problematic. This is evidenced by a mean of 1.39, with 0.86 standard deviation recorded. This indicates that most of the respondents disagreed with the researcher on this aspect. Client information can also be effectively exposed if audit company employees purposefully or inadvertently disclose it to third parties.

Furthermore, most of the respondents held the view that client information should never be shared with anyone who is not part of that particular task. The related proposition as put forward by the researcher elicited a mean response of 4.45, with a 0.926 standard deviation. Most respondents thus reckoned that the most ideal situation is one where tasks mimic closed loops within firms with all the relevant client information circulating within the loops made up of those directly involved in a given task. Divulging of such information to any other party even within an organisation would be viewed as a breach of a kind. Lastly, most of the respondents disagreed that pop up messages whilst online are good as one would not miss specials. Most of the respondents reckoned that such pop ups were not good in the context of IS in audit firms. The means response of 1.60 indicated disagreement and the 0.855 standard deviation indicated low variability of responses and high mean reliability. Pop up notification have seen wide use in cyber-attacks with perpetrators employing these in their quest to steal information or gain control over a certain kind of information. However, these are only useful to perpetrators if would-be victims act in a certain way thereby allowing these pop-up notifications to show and open on their devices.

Overall, findings thus show that there were high levels of awareness of client IS threats and interest in the IS aspect of the audit firms.

16 Relevance and Effectiveness of Measures or Strategies Being Utilised in Audit Firms to Safeguard Electronically Stored and Transmitted Client Data

The study also considered the relevance and effectiveness of client IS measures applied by audit firms to safeguard client data. Statements were also put forward by the researcher and respondents had to indicate the extent to which they agreed or disagreed on a 5-point Likert scale. Results are shown in Table 5 below.

Findings in the table above show that there are measures utilised in the firm to safeguard electronically stored and transmitted client data to effectively prevent access, disruption, and modification of information by unauthorised users. The mean response of 4.42 is evidence of this and the standard deviation is 0.616, indicating low variability of the responses provided and high mean reliability. Thus, respondents held the view that their respective audit firms had certain measures in place to ensure client IS. In this context, the assessment of the effectiveness and relevance of IS mechanisms was primarily undertaken logically as opposed to

Table 5 Effective of measures

	Responses	Minimum	Maximum	Mean	Std. deviation
There are measures utilised in the firm to safeguard electronically stored and transmitted client data to effectively prevent access, disruption and modification of information by unauthorised users.	149	3	5	4.42	.616
There are frequent security awareness presentations within the firm that are non-technical and easy to understand.	149	1	5	3.83	1.093
It is okay to send clients information using public email addresses (Gmail, yahoo, etc.).	149	1	5	1.40	.718
All security awareness sessions are mandatory to attend.	149	1	5	3.97	1.033
Access to client information is restricted to only members of that particular audit team.	149	1	5	4.46	.834
Organisational policies on cybersecurity controls are clearly documented and easy to understand.	149	1	5	3.98	.896
Measures utilised in the firm to safeguard electronically stored data are effective in serving their purpose.	149	1	5	4.19	.774
Valid N (listwise)	149				

Source: Primary data

use of any precise metric or actual measure of hardware and software components. The study therefore relied on perceptual responses which reflected the perception of the individuals included in the study regarding the relevance and effectiveness of the measures that are in place. As a result, the perspectives of people working in audit companies provide a clear understanding of the effectiveness and relevance of the measures in place.

Most respondents indicated that there were frequent security awareness presentations within their firms that are non-technical and easy to understand (mean = 3.83; SD = 1.093). Facilitating and making security awareness presentations may not be enough if these are not easily understood by the intended audience. In the current context, audit firms are shown to have mostly undertaken presentations which are easy for the audience to understand. These approaches acknowledge the value of human resources in data security. This signals a shift from the traditional focus areas which saw human resources being largely side lined in this regard.

Many organisations have become aware of the prospect of attacks emerging from inside the entity, leading a significant growth in the relevance of human resource security in the IS environment. The researcher included a statement regarding transmission of client information via personal third-party email services. Most of the respondents disagreed with the researcher regarding the appropriateness of this. The mean response was 1.40 and the standard deviation was low, namely at 0.718. Thus, most of the respondents deemed it not okay to send client information using public email addresses hosted by third parties. These emails may not be the most secure as the influence of the firm on the security of these is limited.

All security awareness sessions run by audit firms are mandatory to attend, and this is the view shared by most of the respondents, as indicated by a 3.97 mean. The standard deviation of 1.033 recorded was low. Employees in most of the firms thus may not have the right to choose whether they want to be part of security awareness sessions or not, as these are mandatory. The importance of IS in audit companies may have influenced their choice.

Moreover, most of the respondents indicated that access to client information is restricted to members of that particular audit team. The mean response recorded was 4.46, with a 0.834 standard deviation. Just like with task teams, client data is shown to have been secured through effective access control to ensure that only audit team members had access to relevant client data.

Most of the respondents also shared the view that organisational policies on cyber security controls are clearly documented and easy to understand. This is shown by a 3.98 mean response, which is a reliable score as indicated by a low standard deviation of 0.896. Thus, most respondents perceived that firms had well documented and understandable cyber security policies.

Findings indicate that measures that are utilised by firms in safeguarding electronically stored data are effective in relation to their purpose. The mean response in this regard was 4.19 and the standard deviation was 0.774. Respondents thus held the view that their audit firms had effective measures in place to ensure the security of client data. This is important for IS. Failure to put in place effective IS measures exposes firms to data breaches which may have a negative effect on firms and their reputations in the market especially given the firm's duty of care. The importance of effectively safeguarding client information cannot be overemphasised and it has been noted widely in extant literature.

17 Measures Implemented in Small to Medium Audit Firms against Widely Accepted Industry Standards and Frameworks

This was the last objective of the study and it relates to how measures implemented by South African audit firms compare to best practices globally. In order to address the objective, the researcher put forward different best practices in IS and respondents were required to indicate the extent to which they agreed with the assertions by the researcher. Results are shown in Table 6: below.

Most of the respondents agreed with the researcher on the use of hard drive encryption as a measure for securing client information in the firms under study (Mean = 3.94; SD = 0.864). The low mean response score indicates high reliability of the mean score and low variability of the responses. However, respondents were largely uncertain regarding the use of USB port locking, and this is indicated by a mean score of 2.84 that was obtained for the item. Thus, most of the participants were not certain on whether audit firms under study have used USB port locking as an IS measure or not. A low standard deviation of 0.922 was evidence of high reliability of the mean and low variability of responses.

Regarding memory stick encryption, most of the respondents agreed that was the case in their audit firm. The mean response in this regard was 4.02, with a 0.788

Table 6 Measures implemented

	Responses	Minimum	Maximum	Mean	Std. deviation
Hard drive encryption	149	1	5	3.94	.864
USB port locking	149	1	5	2.84	.922
Memory stick encryption	149	1	5	4.02	.788
Use secure remote access methods (e.g. VPN)	149	3	5	4.89	.667
Utilise role-based access controls	149	1	5	4.39	1.022
Internal firewall	149	1	5	4.45	.694
Use of strong passwords	149	2	5	4.60	.758
Involving partners/executives in cybersecurity initiatives	149	1	5	3.94	.982
Utilise intrusion detection systems (IDS)	149	2	5	4.06	1.002
Security awareness sessions conducted frequently	149	1	5	4.08	.746

Source: Primary data

standard deviation. Most of the respondents were of the view that their audit firms had memory stick encryption in place. Findings also show that most of the respondents perceived their firms as utilising secure remote access methods like Virtual Private Network (VPN) in IS (Mean = 4.89; SD = 0.667). Remote access methods were thus perceived to be in use in most of the audit firms that were under study by respondents.

Furthermore, respondents indicated that role-based access control was in place in their audit firm. The results are evidenced by a 4.39 mean score and a standard deviation of 1.022. This suggests that most of the respondents submitted that they worked in audit firms where one's role is an important consideration in determining the kind of access they are given to information. Internal firewalls are also perceived by most of the respondents to be utilised by their audit firms. The mean score was 4.45 while the standard deviation was 0.694. Firewalls are a common information security feature in modern organisations and as observed in the current context, audit firms also utilised these.

This is also the case with the use of strong passwords, which is clearly common amongst audit firms based on the perceptual data drawn from respondents as evidenced by responses from a mean score of 4.60 (SD = 0.758) as recorded. The use of strong passwords can be implemented through ensuring that every member that accesses information has to log in with their password, which is required to be constituted of a certain number or type of characters. Moreover, most of the respondents stated that involvement of partner/executives in cyber security initiatives is a practice that is in place in their respective audit firms. The mean response in this regard was 3.94 while the standard deviation was 0.982. Whilst there may be many facets to how this enhances IS, the most basic way is through ensuring that the necessary management support and buy-in is obtained for these initiatives. This involvement of senior management as well as their support for IS efforts is a widely accepted trend in modern businesses.

Intrusion detection systems are also shown by participants to have been applied in their respective audit firms (Mean = 4.06; SD = 1.002). These relate to a timely detection of any intrusion in the information infrastructure by unauthorised individuals as well as abuse of privileges. This is important in ensuring that the necessary responses are effected in a timely manner to prevent or minimise the damage of such breaches. Lastly, most of the respondents agreed that their audit firms conducted frequent security awareness sessions (Mean = 4.08; SD = 0.746). These are normally administered with a view to ensuring that individuals in a firm have a clear understanding of certain important IS aspects including pitfalls, risk factors as well as best practices. The foregoing takes cognisance of the role of employees, including their attitudes and behaviour in contributing to IS breaches and threats. Creating such awareness amongst employees would circumvent the potential impact of ignorance, and neglect, both of which may have detrimental effects on firms' IS. Efforts to create awareness may prove to be the master stroke as they are likely to also mould the attitude of employees in a manner that may serve to optimise IS.

Suffice to say the findings indicate that respondents perceive that there is a wide application of self-protection measures in an attempt to optimise IS in audit firms.

Self-protection is at the core of IS and it relates to measures that are implemented to protect organisations from IS threats. Self-protection makes use of measures like passwords, firewalls, and intrusion detection systems (IDSs).

18 Level of Awareness among Small to Medium Audit Firms' Trainees and Auditors in Respect of Cyber Related Risk to Confidential Client Information

The above was the first stated objective of the study and results showed that there was generally a high level of awareness amongst the different respondents included in the study. Important IS aspects like the ISP in place within firms, different forms of cyber-attacks and actions that may expose firms to such attacks were well understood by the respondents. The high awareness levels may be a culmination of different aspects, including efforts that firms may have made to ensure that insiders are fully aware of IS matters. In the same vein, there was generally interest in IS matters of the firms in which respondents served, which is direct benefit of the firms' investments.

19 Relevance and Effectiveness of Measures or Strategies Being Utilised in Audit Firms to Safeguard Electronically Stored and Transmitted Client Data

The study also considered the relevance and effectiveness of client IS measures applied by audit firms to safeguard client data. Findings indicated that most firms have implemented measures to safeguard client data that they have electronically stored. These measures have been shown to prevent any form of attacks or breaches of the data which may compromise the integrity, availability, and accuracy of the data. One of the common measures raised was awareness programmes. This shown to be well suited for the audience as they were understandable. Audit firms have also made awareness programmes compulsory, and these have been augmented by well documented IS policies.

20 Measures Implemented in Small to Medium Audit Firms against Widely Accepted Industry Standards and Frameworks

This was the last objective of the study and it relates to how measures implemented by audit firms compared to best practices globally. Results showed that most of the best practices utilised globally have been adopted in the audit firms under study.

Secure access methods, like use of VPNs, are a widely adopted measure amongst firms. The same can be said in the case of role-based access control, which has one's role as the main determinant of the kind of data that they can access. Internal firewall usage has also seen wide use in the audit firms studied with 89.86% responding in the affirmative to questions relating to whether internal firewalls are utilised in their firms. Firewalls are a common IS feature in modern organisations and as observed in the current context, audit firms also utilised these. USB port locking has however not seen much use as only a few firms have been shown to have this measure in place. Hard drive and memory stick encryption have also been fairly utilised in the firms as well as the utilisation of strong passwords. Involvement of partner/executives in cyber security initiatives is a practice that is in place in their respective audit firms.

The measures above are widely applied in IS and in most cases, they are applied in such a way that they complement each other. The use of multiple measures enables a comprehensive approach to protecting information.

21 Recommendations

The study recommends the following:

- Regulators and policy makers should try to provide the necessary guidance with regards to client IS optimisation amongst audit firms. This would help standardise this aspect while also encouraging the adoption of best practices.
- Results showed high levels of awareness regarding cyber related risks to confidential client information that they handle or transmit during and after audit engagements. It is important for management in audit firms to adopt more sustainable approaches to ensure that the high levels of awareness are maintained going forward.
- There is also need for management in audit firms to review measures in place to address cybersecurity risks from time to time given the dynamism and evolution of cybersecurity threats posed by insiders. The regular reviews would help ensure that the measures remain relevant in their usage area.
- Management in audit firms also needs to explore other measures that can be applied in addressing insider threats to IS in an audit environment and this will allow firms to achieve multi-layered security infrastructure while also having in place the most effective measures.
- While results showed a wide adoption and use of global best practices, there is still no universal adoption and management in audit firms should strive to adopt such measures to ensure that is optimised.

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The Role of Data Analytics in Enhancing External Audit Quality

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Abstract Due to corporate failures, audit quality concerns and the rapidly changing IT environment in the financial reporting value chain, more auditors are using data analytics tools to enhance audit quality. However, researchers have not made significant progress in establishing the extent to which the Big Four audit firms in South Africa incorporate data analytics into the external audit process and whether this enhances the quality of the audit. The study investigated the role of data analytics in enhancing external audit quality in South Africa, the relationship between external audit, audit quality and data analytics and the impact of the latest technological advancements, commonly known as the Fourth Industrial Revolution, on the way firms perform audits. The study also explored whether audit firms in South Africa utilise data analytics, on which engagements and during which stages of the audit process, what the benefits and challenges of using data analytics are, and what the impact of using data analytics is on audit regulatory inspection results. This was achieved through a literature review and an empirical study conducted using a questionnaire. The study revealed strong evidence that there are notable audit quality concerns in South Africa, which have been attributed to a failure in audit quality, and that auditors are using data analytics to overcome these concerns. Based on the study's findings, it was concluded that using data analytics in an audit enhances external audit quality.

Keywords External audit · Audit quality · Data analytics · Audit process · Information technology

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1 Introduction

An external audit of financial statements (hereafter "an audit") is a significant contributor to the overall economy (Etim et al., 2020). It is performed with the sole purpose of reporting whether financial statements were prepared in accordance with the financial reporting framework (International Auditing and Assurance Standards Board, 2014). When these financial statements lack accuracy, contain errors or omissions, or are even misleading, the public that relies on these financial statements may make misinformed and/or incorrect economic decisions (Salih & Flayyih, 2020).

Despite its significance, the auditing profession has experienced several difficulties worldwide (Kueppers & Sullivan, 2010). These challenges include advancements in technological developments and, most importantly, the decline in audit quality, which has caused stakeholders to doubt the audit profession and the audit process as a whole (Aziza & Agus, 2019).

Numerous corporate failures have also been experienced in South Africa, partly attributed to audit quality failure. This is echoed by Harber (2016), who states that there have been several known corporate failures in South Africa in the past, with the collapse of the African Bank being one of them. According to (Marchant & Mosiana, 2020), corporate failures in South Africa, include VBS Bank, whose investors, largely stokvels and municipalities, suffered a great loss due to KPMG's failure to raise red flags in the bank's financial statements and KPMG issuing a falsified regulatory report.

Etim et al. (2020) describe how the effects of corporate failures are often felt by stakeholders, investors or shareholders, as billions are lost in the financial value chain when these companies collapse. This statement is echoed by Cole et al. (2021), when they state that financial instability or scandals cause company failures, which have severe negative effects on all parties involved, including the general public, workers, auditors, creditors, business partners, capital markets, investors, and regulators.

The corporate failures noted above clearly indicate that both internationally and in South Africa, there is evidence of poor audit quality, which severely impacts the stakeholders. A question of why audit quality is important may arise. An audit assures the credibility of financial statements and, as such, a quality audit contributes greatly to this credibility (EY, 2019; Haapamäki & Sihvonen, 2019; Kilgore et al., 2011; Soyemi et al., 2021).

In its Global Competitiveness Report, the World Economic Forum has previously ranked the IRBA as the best standard-setting and regulatory body in the world (Issirinarain, 2016). This statement is echoed by the Business Day (2020) in an article titled *How a Mighty Profession Has Fallen*, which states that the South African auditing standards were recognised as number one out of 141 globally in the World Economic Forum's (hereafter WEF) 2016 Global Competitiveness Report, holding that position for seven preceding years in a row. However, South Africa's auditing profession is no longer considered the best in the world

(Independent Regulatory Board for Auditors, 2019). The WEF's 2019 Global Competitiveness Report, which was the latest to list countries by rank, listed South Africa as number 49 out of 141 for the strength of its auditing and accounting standards (World Economic Forum, 2019). This shows an evidence for the deterioration in the audit quality in South Africa. Over and above the regulator's inspection results and the drop in the IRBA's ranking as the best standard-setting and regulatory body in the world, there are numerous instances of corporate failures which have been witnessed previously, which have been attributed to a lack of audit quality, as discussed above.

To respond to corporate failures, audit quality concerns and the rapidly changing IT environment in the financial reporting value chain and to improve audit quality, more auditors are utilising data analytics techniques (Earley, 2015). This statement is echoed by International Auditing and Assurance Standards Board (2018) and Appelbaum et al. (2017), who states that there has been a change in how audits are performed over the years due to a change in the technological landscape in which organisations are operating. This can be seen by organisations' use of the cloud and the internet of things, among other things, as part of their accounting systems.

As organisations are changing the tools they use to account for transactions, external auditors have also been exploring innovative ways to effectively and efficiently audit these transactions over the years. The International Auditing and Assurance Standards Board (2018) supports this by stating that the change in how companies operate has necessitated the need for auditors to consider new or different ways of performing audits of financial statements. This is echoed by Association of Chartered Certified Accountants and Chartered Accountants Australia and New Zealand (2019), which states that nearly all businesses are on the front lines of disruptive innovations that impact their auditors. Auditors must equip themselves accordingly to keep up with the changes in technology. One way auditors stay relevant is by introducing data analytics (Chartered Professional Accountants of Canada, 2016).

Auditors are using data analytics tools to, among other things, obtain an extensive understanding of their clients' businesses (Earley, 2015). Similarly, Krieger et al. (2021, p. 1) note that "audit firms are increasingly engaging with advanced data analytics to improve the efficiency and effectiveness of external audits through the automation of audit work and obtaining a better understanding of the client's business risk and thus their own audit risk". Additionally, as a result, auditors broaden the scope of the items they audit. Botez (2018) supports this by stating that using traditional sampling methods to obtain audit evidence as required by auditing standards changes due to application of data analytics. This is because using data analytics for audits raises the quality of such audits (Alsahli & Kandeh, 2020; Gao et al., 2020).

It is imperative to understand how IT landscape developments impact audit quality. The Centre for Audit Quality (2018) explains this by stating that it is less likely for auditors to design traditional substantive procedures (like tests of details or substantive analytical procedures) that, if executed exclusively, would provide sufficient appropriate audit evidence to address identified assertion-level risks as the use of emerging technologies in the financial reporting process increases.

It is evident that auditors are introducing more data analytics into their audits, as there is a growing need for auditors to enhance audit quality. However, the result of using data analytics by auditors is a topic that needs to be explored further (Wang & Cuthbertson, 2015). This is supported by Earley (2015), who states that even though academic research on data analytics has gained momentum, research on this topic is still lacking due to auditing and accounting firms not providing researchers with feedback on their experiences in using data analytics.

Over the years, the world has witnessed instances where external auditors have issued unqualified or "clean" audit opinions for entities which collapse afterwards due to irregularities and/or fraud which is subsequently revealed in these entities, a term Etim et al. (2020) defines as "audit failure". This definition of the term is elaborated on by Smith and Marx (2021), who state that audit failure is frequently linked to company failures and dishonest financial reporting. In many cases, it is thought that the auditors violated their obligation to serve as the "watchdog" for those who utilise financial statements by allowing fraudulent acts to go unnoticed (Smith & Marx, 2021). Audit regulators worldwide, including the Independent Regulatory Board for Auditors (hereafter IRBA), South Africa's regulator, have blamed these failures on the poor quality of audits (Huang et al., 2019).

The fundamental research question of the study is to understand what role data analytics plays in improving the quality of external audits in South Africa. Furthermore, the link between data analytics, audit quality, and external audit is explored as well as the impact of the latest technological advancements, commonly known as the Fourth Industrial Revolution, on the way firms perform audits. The study also considers the benefits and challenges of using data analytics by audit firms in conducting audits.

2 Literature Review

The audit function has become incredibly important over the years. This can be attributed to what the mandate of an audit is, which is to give the financial statements that are being audited credibility (Harber, 2016). The responsibility of providing credibility to these financial statements does not solely rest with the auditor, but is also dependent on other factors including the quality of the financial statements, the oversight role played by those charged with the governance of the entity, and regulatory requirements (Accounting and Corporate Regulatory Authority & CPA Australia, 2015).

Despite its significance, the auditing profession has experienced several difficulties worldwide (Kueppers & Sullivan, 2010). These challenges include advancements in technological developments and, most importantly, the decline in audit quality, which has caused stakeholders to doubt the audit profession and the audit process as a whole (Aziza & Agus, 2019).

2.1 The Audit Function

The IRBA, the national standard-setter and audit regulator in South Africa, defines an external audit as:

"'audit' means the examination of, in accordance with prescribed or applicable auditing standards

- financial statements with the objective of expressing an opinion as to their fairness or compliance with an identified financial reporting framework and any applicable statutory requirements; or
- financial and other information, prepared in accordance with suitable criteria, to express an opinion on the financial and other information;" (Republic of South Africa, 2005, p. 8)

In the past, auditing's primary responsibility was to verify that there was no fraud occurring in government organisations and that the state's income and expenses were accurately recorded (Teck-Heang & Ali, 2008). According to Kueppers and Sullivan (2010), this remains relevant, as some stakeholders recognise the true importance of an audit and believe that an audit was only successfully executed if no fraud and/or an error was discovered throughout the audit process.

Apart from audit being used as a fraud detection tool, Kumar and Mohan (2015) argue that the main objective of an audit is to reassure the stakeholders who use the financial statements of the accuracy of those financial statements. This is supported by the International Auditing and Assurance Standards Board (2021) in International Standards on Auditing (ISA) 200, *Overall Objectives of the Independent Auditor and the Conduct of an Audit in Accordance with International Standards on Auditing*, which states that the goal of an audit is to increase intended users' level of trust in the financial statements. This is done by the auditor judging whether the financial statements were produced in compliance with the appropriate financial reporting framework in all material aspects (International Auditing and Assurance Standards Board, 2021).

2.2 Audit Quality

Salih and Flayyih (2020) state that defining audit quality remains challenging for both professional organisations and academics. This statement is supported by (Hosseinniakani et al., 2014), who states that the numerous different aspects that might impact quality make it difficult to define audit quality.

This statement is confirmed by the International Auditing and Assurance Standards Board (2014), which argues that there is no universally recognised definition or measurement of audit quality due to its complexity. According to Knechel et al. (2012), academics have performed various studies to define audit quality with no success. Similarly, Rainsbury (2019) mentions that regulators and standards-setters have also dedicated time and agendas to develop a universal definition of audit quality. However, these attempts have also been unsuccessful. According to Christensen et al. (2016), audit firms have also been involved in fruitless talks to develop a definition of audit quality. In addition to being a challenging term to define, audit quality is also challenging to measure (Christensen et al., 2016; Kilgore et al., 2011). Knechel et al. (2012) support this statement when they state that there is still no agreement over how to define, let alone quantify, audit quality despite more than two decades of studies.

Based on a detailed review of the available definitions of audit quality, the most common definition is that by DeAngelo, as cited by most academics in their recent studies on audit quality (Harber, 2016). According to DeAngelo (1981), audit quality is the likelihood that an auditor would discover and disclose misstatements in the auditee's financial statements to the appropriate stakeholder. This concept is echoed by Xiao et al. (2020), who explains that the probability that an auditor will uncover and report an existing major misstatement in line with the audit objective is known as audit quality. The International Auditing and Assurance Standards Board (2014), in its *Framework for Audit Quality* (hereafter the Framework), defines audit quality as an audit performed by a team that illustrates appropriate values, ethics, and behaviours by teams that were adequately qualified, competent, and experienced, and had sufficient time allocated to perform the audit work.

The International Auditing and Assurance Standards Board published the Framework in 2014 to promote what constitutes audit quality, putting the notion of audit quality on the agendas of important stakeholders and prompting key stakeholders to consider how audit quality might be enhanced. The Framework lists the following as elements of audit quality (International Auditing and Assurance Standards Board, 2014):

- Inputs – This includes the auditor's ethical behaviour, skills, knowledge and experience required to perform an audit;
- Process – this entails how detailed both the audit process and quality controls are that will be utilised in the audit;
- Outputs – outputs are items, such as the auditor's report, distributed to the appropriate parties following an audit.
- Key interactions within the financial reporting supply chain refer to the type of relationship and communication that an auditor has with management and the business owners.
- Contextual factors include, for example, laws and regulations and corporate governance frameworks that need to be adhered to by the auditor as part of the audit.

In its *IRBA Public Inspections Report on Audit Quality 2021*, the IRBA (Independent Regulatory Board for Auditors, 2021) highlighted that audit quality might be achieved if audit firms and individual auditors can work on improving on deficiencies noted by regulators during firm and individual file inspections. On the other hand, audit quality may be attributed to having individuals with the required skills, knowledge, competence and ethical values as part of the audit team (Accounting and Corporate Regulatory Authority & CPA Australia, 2015; Alsughayer, 2021; Centre for Audit Quality, 2018). In addition, Garcia-Blandon and Argiles-Bosch (2018) point out that firms and individual auditors possessing the required knowledge or specialisation in the industry in which the auditee operates may result in higher audit quality. EY (2019) further stated that an essential component of audit quality is the use of technology and the digitisation of the audit process, as technology and digitisation allow auditors to perform audits more efficiently. This allows auditors to channel their resources towards focusing on the more important sections that require the auditor's judgement.

2.3 Data Analytics

Over the past 10 years, auditors have increasingly used data analytics tools in audits (EY, 2015). Murphy and Tysiac (2015) echoes this when highlighting that over the past 20–30 years, auditors have been using more technology in an audit. (Earley, 2015) stated that this debunks the myth that audit and accounting firms do not employ data analytics throughout the external auditing process.

Data analytics is an instrument that an auditor can use to gather audit evidence through the identification and analysis of relationships between data, formulating expectations, combining data from different sources, and also using graphics or visualisations to reach conclusions (American Institute of Certified Public Accountants, 2015; Botez, 2018). This can be done at different stages in the audit, from pre-engagement activities to planning and executing the engagement and reporting (Botez, 2018).

Data analytics is classified into four types: descriptive analytics, diagnostic analytics, predictive analytics, and prescriptive analytics (Harvard Business School, n.d.). According to Tschakert et al. (2016) and Al-Dalabih (2018), descriptive analytics use past information to provide insights into what is happening. An example of descriptive analytics is an analysis of percentage changes in data and year-on-year financial statement analysis (Al-Dalabih, 2018; Tschakert et al., 2016). On the other hand, diagnostic analytics answers why something happened (International Federation of Accountants, 2018). Tschakert et al. (2016) mention that diagnostic analytics provide answers as to why the results came out the way they did. Variance analysis, explaining historical outcomes, is one example of diagnostic analytics (Tschakert et al., 2016). Harvard Business School highlights that diagnostic analytics are more detailed than descriptive analytics in explaining why something happened. Another type of data analytics, predictive analytics, uses patterns identified in historical data to predict what the future will or should look like, when something will happen and why it will happen (Al-Dalabih, 2018). Harvard Business School mentions that predictive analytics uses results of past trends and assumptions to make predictions possible. Tschakert et al. (2016) mention that an example of predictive analytics would be predicting how much of a trade receivable balance will

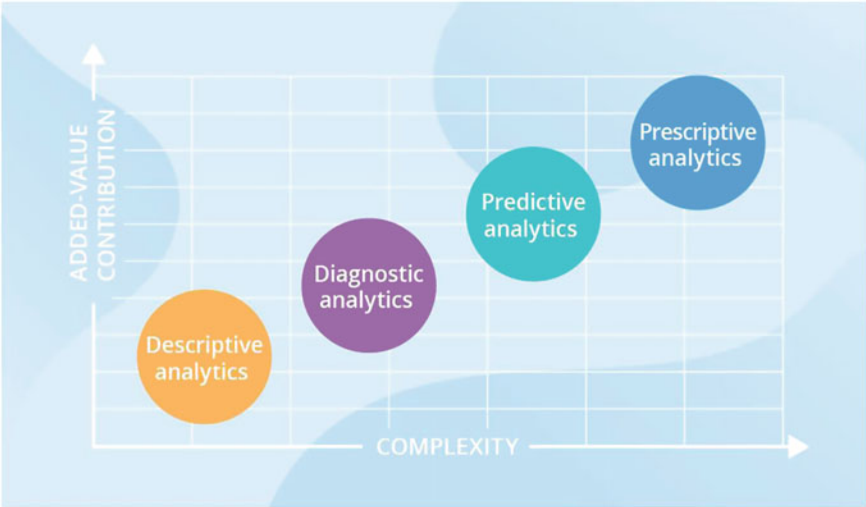

Fig. 1 Complexity of data analytics versus value-add. Source: (Bekker, 2019)

be collected in the future using that specific trade receivable's payment history. Lastly, prescriptive analytics answers the question of what should happen (International Federation of Accountants, 2018).

(Bekker, 2019) argues that the more complex the type of data analytics is, the more beneficial it is and, as such, adds more value to the audit process, as can be seen in Fig. 1 below. In simple terms, prescriptive analytics, when utilised, provide more value than predictive, diagnostic and descriptive analytics due to the complexity thereof.

2.3.1 Benefits of Using Data Analytics

An auditor has several benefits when using data analytics at different phases of an audit. Data analytics during the audit planning stage provides the auditor with a comprehensive understanding of the business, allowing them to understand better the organisation and its operations (Eilifsen et al., 2020). Using anomalies, trends analyses, correlations, and fluctuations may help inform decisions about potential risks of material misstatement. This will ensure that auditors focus on significant items that matter and in ensuring that auditors obtain new in-depth insights about their clients (Earley, 2015; International Auditing and Assurance Standards Board, 2018; Murphy & Tysiac, 2015). According to (Zhu, 2021), data analytics also makes it possible to visually present the results of procedures performed to understand the entity, making it easy to spot the anomalies and where potential risks may arise.

Using data analytics during the execution stage of the audit results in efficiencies Liew et al. (2022) and Murphy and Tysiac (2015) supports this statement by stating that data analytics guarantees that 100% of the population could be tested rather than testing account balances, classes of transactions, and disclosures on a sample basis. This eliminates the limitations of concluding the entire population based on audit evidence, or a snapshot obtained from a sample selected and tested (Huang et al., 2022). Another advantage of data analytics includes enabling quick and simple testing of the whole population by the auditor O'Donnell (2015) and may also help the auditor identify fraud risk indicators to develop appropriate responses to this risk (EY, 2015). Earley (2015) and International Auditing and Assurance Standards Board (2018) also highlight that data analytics give auditors more persuasive, relevant, and sufficient audit evidence, which serves as the foundation for the auditor's opinion, and that instead of performing the audit towards or at year-end, the utilisation of data analytics allows auditors to perform an audit throughout the year.

Murphy and Tysiac (2015) further mentions that achieving a higher degree of assurance at a similar cost, resulting in better audit quality for customers and investors and less audit risk and liability for auditors, would be the best benefit of utilising data analytics. This is supported by Raphael (2017), who states that using data analytics reduces auditors' time to gather the necessary information for the audit. Another benefit of using data analytics is that it provides useful insights that an auditor can share with the audit committee. In contrast, data analytics can be seen as the key differentiating factor between audit firms when it comes to audit tendering (Financial Reporting Council, 2017).

2.3.2 Challenges of Using Data Analytics

The use of data analytics in an audit has been gaining momentum. However, it presents unique challenges that auditors must address before it becomes a norm (Earley, 2015). According to a survey performed by KPMG in 2014, 85% of the respondents mentioned that the biggest challenge with using data analytics was the inability of the audit teams to analyse the data collected successfully. Al-Ateeq et al. (2022) mention that one challenge to adopting data analytics is that auditors have not received enough training on how to use data analytics. Wüsthoff (2017) states that both audit firms and universities are behind in terms of teaching trainee accountants and students, respectively, about data analytics.

Another challenge auditors' face in using data analytics is the quality of data received from their clients. According to Liew et al. (2022) and Earley (2015), auditors often struggle with obtaining data to analyse from clients, and when they do, they sometimes obtain incorrect or irrelevant data. This is echoed by Zhu (2021), who states that auditors face another challenge: clients often provide incomplete data to be analysed.

Literature also highlights the following as challenges faced by auditors in utilising data analytics in the audit process:

- Audit teams struggle with obtaining sufficient and appropriate audit evidence when using data analytics, or they fail to document work performed using data analytics per the ISAs (Financial Reporting Council, 2017; Huang et al., 2022).
- As audit teams obtain client data to analyse, they do not focus on ensuring that the client data remains secure from threats. This exposes the audit firms to a possible risk of reputational damage (Financial Reporting Council, 2017; Zhu, 2021).
- The initial cost of setting up and utilising data analytics is usually high. To save the audit budget, auditors resort to not utilising any data analytics in their audits (Huang et al., 2022; Wang & Cuthbertson, 2015).
- Some data analytics tests show "false positives", where the results are inaccurate based on the data analysed. Auditors struggle with properly evaluating and concluding in these circumstances (Brazel et al., 2022; Wang & Cuthbertson, 2015).
- There is an expectation gap between regulators and users of financial statements as they believe that utilising data analytics results in auditors providing absolute assurance on the financial statements, as opposed to reasonable assurance as required by the ISAs (Earley, 2015; Zhu, 2021).

2.4 The Relationship Between External Audit, Audit Quality and Data Analytics

As stated above, auditors have been using some form of analytics for some time. In the past, the environment in which companies operated was not as complicated as it is currently, and therefore there was no need to use automated processes in the audit (International Auditing and Assurance Standards Board, 2018). Since then, the world has experienced a change in the Information Technolofy (IT) landscape (Al-Ateeq et al., 2022), and auditors have used information technology tools in an audit since the companies being audited started using computerised systems to record their transactions (Financial Reporting Council, 2017).

Prior to advances in IT, companies used to record transactions manually, which unintentionally led to, among other things, monthly and/or yearly reporting being performed late, disorganised filing systems that were difficult to use and navigate, and several errors, omissions and misstatements being noted in the financial information. With advances in IT, there has been a shift in how companies record their transactions, which is now simplified and performed with the audit of IT systems. This resulted in monthly and/or yearly reporting being performed timeously and with fewer human errors, omissions and misstatements (Imene & Imhanzenobe, 2020).

Manita et al. (2020) note that digitalisation will improve the audit relevance and also improve the audit quality. Furthermore, they state that this will enable the culture of innovation within audit firms Specifically, traditional CAATs, which include ratio analyses, prior year versus current-year comparisons and trend analyses, according to SAB&T (2018) has been used by auditors for many different reasons during the audit process. This is further supported by Wüsthoff (2017), who mentions that the Big Four has invested in technology that helps them perform tasks that may be tedious or those that do not provide significant benefit for the auditor and the client in the shortest time possible.

Coupled with the changing IT landscape, data analytics is increasingly being used in the audit process, and there are more auditors employing data analytics now than ever before (Krieger et al., 2021). According to O'Donnell (2015), the introduction of data analytics in an audit does not change the basics of what auditors do, as auditors have always collected, analysed, and issued conclusions on the analysed data since the auditing profession started. Furthermore, Verver (2013) states that throughout the preceding 20 years, auditors have integrated the use of data analysis into audits.

To improve efficiencies and effectiveness of audit procedures, auditors have over the years used technology not limited to Microsoft Excel, Audit Command Language, Interactive Data Extraction and Analysis or the internet to perform tasks including financial statements analysis (both with prior years or industry norms), journal entry testing (including an analysis of abnormal or missing journals) (American Institute of Certified Public Accountants, 2015).

A question may arise regarding the relationship between external audit, audit quality and data analytics. Many authors have concluded that using data analytics in the audit process enhances audit quality (Brazel et al., 2022; Dagilienė & Klovienė, 2019; Jacky & Sulaiman, 2022). As stated above, by applying data analytics, auditors may better identify risks, such as the likelihood of fraud, by developing a comprehensive picture of the client. Furthermore, data analytics allows the auditor to test the whole population rather than just a sample. The role of data analytics is emphasised by Earley (2015), who states that not only does the use of data analytics provide auditors with greater coverage in terms of sample sizes, but it also provides auditors with greater insight into the client's processes, resulting in enhanced audit quality. The role of data analytics in enhancing audit quality can be summarised by (De Santis & D'Onza, 2021), who state that data analytics may be a game changer in improving audit quality and revolutionising auditing practices.

3 Methodology

The study followed a qualitative approach in exploring the role of data analytics in enhancing external audit quality. This approach was used because it enables the researcher to delve into people's and groups' perspectives on an issue (Creswell, 2009). Criteria for selecting the study participants were developed, which included that the audit firm must use data analytics in performing its audits, and participants must thoroughly understand what data analytics, audit quality, and the audit function are. Purposive sampling was used to select the sample for the empirical study, allowing the researcher to have discretion in choosing audit firms that met the given criteria, South Africa's Big Four audit firms. The empirical study used the survey method, consisting of a questionnaire sent to the heads of audit departments for each of the Big Four audit firms in South Africa. According to the (Independent Regulatory Board for Auditors, 2017), these firms also hold the largest market share of overall audit fees spent by JSE-listed companies. These participants are chosen because they have the required knowledge of data analytics, audit quality and the external audit function. Data received from the participants were analysed thematically to derive similarities from the participants to allow the researcher to reach conclusions on the responses.

During the research, ethical issues were considered to ascertain that participants did not suffer any physical or emotional harm. Ethical clearance for the study was also granted. All information was kept private and only used to generate aggregate results.

4 Findings

4.1 The Fourth Industrial Revolution's Impact on the Audit Process

4.1.1 Question

In your opinion, how considerably have the latest technological advancements, commonly known as the Fourth Industrial Revolution, affected how your audit firm performs audits of financial statements? Please justify your answer.

4.1.2 The Objective of the Question

This question aimed to establish the participants' perspectives of whether and/or how much information technology advances, commonly known as the Fourth Industrial Revolution, has affected the way audit firms perform audits of financial statements.

4.1.3 Presentation of Findings

The participants revealed the following in response to this question (Table 1).

4.1.4 Interpretation of Findings

From the review of the data, it is evident that the participants undoubtedly agree that the Fourth Industrial Revolution has affected the way that audit firms perform audits of financial statements. The participants noted that the Fourth Industrial Revolution

Table 1 The Fourth Industrial Revolution's impact on the audit process

Participant	Feedback from participant
Firm A	In my opinion, the latest technological advancements have had and continue to have a significant impact on the way that firm A performs audits of financial statements. To expand on this, audit tools externally sourced and/or are developed internally allow audit teams to assess balances more intently than previously allowed which caters for more insightful risk identification and consequently the performance of more concentrated substantive testing procedures. Further the existence of Robotic Process Automation (RPA) solutions allow for 100% testing of certain account balances, classes of transactions and disclosures which was previously not possible. A lot of the above has been initiated in response to clients moving away from paper based to paper less accounting and record keeping systems which has shifted the focus from manual controls to general and automated controls.
Firm B	The fourth industrial revolution has considerably impacted the way we perform our audits. Our entire audit process has evolved to become a data led and continues to evolve with a future vision of using more artificial intelligence. We also leverage the digital transformations that our clients are embarking on to build tools that can make the audit process more efficient and cover wider sets of data as opposed to traditional sampling.
Firm C	Broadly speaking, various technologies have had an impact on the way audits are performed. These include Cloud computing, Artificial Intelligence, Robotics, Data & Analytics, Blockchain etc. and each of them are at various stages of deployment and use on audits. Usage also varies from engagement to engagement depending on the client's IT maturity, ability to access data, date format etc. Due to the complexity of certain clients, dependency on IT systems and volume of transaction processing the audit with and of technology has become a necessity. Likewise, auditors have also had to enhance their capabilities, particularly in responding to the risk of fraud, going concern, related party relationships and transactions.
Firm D	Overall – considerably. This will continue to increase. Several new technologies have been introduced over the past few years that have increased the complexity in our client's technology and business process environments. These technologies are characterised by the continuous automation of traditionally manual processes and involve aspects such as AI, big data, internet of things, Blockchain and machine learning. Accurate identification of these new technologies and associated risks directly influences the scope and approach of audit firms. These technologies are also continuously evolving, and audit firms have introduced specialized training curricula that focuses on identifying and understanding these technologies as well as appropriate audit risk identification and mitigation when designing our audit approach. To effectively manage this, our audit teams and our IT specialists' teams work closer together and spend more time at the planning stages of the audit to gain in-depth understanding of the tech and associated IT control environments within these business processes and that support the financial statement line items.

Source: Author's own compilation from accumulated data obtained verbatim from respondents

allowed auditors to be more efficient in their audits. They are able to perform a robust risk assessment based on an in-depth understanding of their client's businesses and perform detailed, tailored procedures in response to these identified risks, which include testing 100% of the population instead of sampling. The above findings are consistent with the literature, where it was stated that the changes in the IT landscape affect how audits are performed (ICAEW Chartered Accountants, 2018). The literature pointed out that introducing IT and digitisation allows auditors to perform audits more efficiently (American Institute of Certified Public Accountants, 2015; EY, 2019).

4.2 Benefits of Using Data Analytics

4.2.1 Question

In your opinion, what benefits does your firm enjoy when using data analytics as part of the audit process?

4.2.2 The Objective of the Question

This sought to understand the benefits the participants enjoy from utilising data analytics in the audit process.

4.2.3 Presentation of Findings

The following was revealed by the participants in response to this question (Table 2).

4.2.4 Interpretation of Findings

According to the literature presented, incorporating data analytics into an audit provides several benefits for firms. Some benefits included testing 100% of the population instead of sampling (Murphy & Tysiac, 2015), performing detailed risk assessments (Earley, 2015; International Auditing and Assurance Standards Board, 2018; Murphy & Tysiac, 2015), and obtaining more appropriate and sufficient audit evidence (Earley, 2015; International Auditing and Assurance Standards Board, 2018), among others. The findings above show that the firms are also enjoying the benefits of using data analytics in their audits. Firms C and D went as far as stating that they believe using data analytics results in a better-quality audit, which echoes the study's goal of investigating the impact of data analytics in improving external audit quality.

Table 2 Benefits of utilising data analytics

Participant	Feedback from participant
Firm A	The benefits that the firm enjoys using data analytics as part of the audit process includes but is not limited to the points below: • More refined risk assessment procedures (i.e. improved risk identification) and profiling. • Driver to completing substantive testing that appropriately addresses the risk. • Facilitates the ability to complete 100% recalculation (i.e. better comfort through more comprehensive testing). • Cleaning data so that it is in a format that can be used by the audit teams.
Firm B	Data analytics provides a far more robust set of audit results than traditional audit procedures. Whilst there is typically some investment time in year 1, the benefits over the medium term far outweigh this from a cost and quality perspective. Even during the planning and risk assessment phase, determining audit risk via data is far more beneficial than traditional procedures as the information is factual and not open to interpretation/ subjectivity as can be the case with traditional procedures. The power of predictive analytics is also becoming more apparent on areas of estimation and judgement where historically the audit was placed in a difficult position in trying to substantiate management's predictions regarding the future outcome of certain activities.
Firm C	Data analytics allows us to assess 100% of the client's data instead of using a sample approach. This allows us to provide a higher level of assurance and a better-quality audit. Data analytics also helps us to focus on risk and better align our audit procedures to these risks. We can more quickly identify outliers and more easily investigate these in detail. We can provide more value to our clients by sharing insights from the analytics.
Firm D	There are several advantages for audit teams and audit firms to use data analytics, most notably an improvement in quality, improved efficiencies, and a better client and people experience (which includes more insights and value to our clients). In a sense we are training the professionals of tomorrow today with teams learning about technology, data and the use of analytics tools to execute their work to provide insights and value. These analytical routines that are built can be repurposed for other client solutions and/or re-used. This allows our people to then spend more time on the judgmental parts of the audit. It also adds to greater efficiency and turnaround time in doing the audit now and in subsequent years. Teams should spend less effort in coming years performing the test area and more time spent analysing the trends/ exceptions.

Source: Author's own compilation from accumulated data obtained verbatim from respondents

4.3 Challenges When Using Data Analytics

4.3.1 Question

In your opinion, which challenges does your firm experience when using data analytics as part of the audit process?

4.3.2 The Objective of the Question

The objective of this question was to learn about the challenges organisations' face when applying data analytics in the audit process.

4.3.3 Presentation of Findings

The participants revealed the following in response to this question (Table 3).

Table 3 Challenges when using data analytics

Participant	Feedback from participant
Firm A	• Navigating Enterprises resource planning (ERP) systems: Clients may have multiple ERP systems which means data from different data source which creates added complexity. • Clients' ERP systems being very outdated. • Clients do not understand their own data and how to get it. • Tone at the top: Some managers/partners don't see the benefits of using the data analytics.
Firm B	The most common challenge remains being able to obtain data from client ERP systems and once obtained there are often challenges with data format and then ensuring the completeness and accuracy thereof. There are also challenges at times with teams not being sufficiently experienced to work with large data sets. Lastly, there are certain situations when the client is so reliant on their system to an extent where they are unfamiliar with their own data.
Firm C	The biggest challenge is the execution of the change management process for both our clients and our people. Following a data analytics approach requires a fundamental change to the way in which we work with our clients and complete the audit process. The management of this change requires substantial upfront investment time from both our clients and our people.
Firm D	Changing the way we perform the audit will always lead to challenges on the journey to become a data driven audit. From a people perspective, equipping our audit teams with the right technology and tools requires a well-coordinated change management plan that not only provides our teams with a view of the power of data and how this will transform the way they will work going forward, but also introducing a training plan so that the teams can learn this new capability and the associated tools and technologies. Another challenge is how we interact and connect with clients to bring them on this journey of sharing data as part of the audit process, and also how we acquire that data in an efficient and secure method that does not add complexity to the audit, but rather produces insight and efficiency. Further challenges are around working with dirty and unstructured data which we solve through our advanced data engineering and analytics techniques.

Source: Author's own compilation from accumulated data obtained verbatim from respondents

4.3.4 Interpretation of Findings

The findings reveal that one of the biggest challenges with using data analytics in the audit process is obtaining good quality and well-structured data in the right format to be analysed by the auditors. The reason why auditors experience the above challenge is either due to the clients' IT systems being outdated, clients having multiple IT systems that interface which may produce different reports of the same data, clients not understanding their own data, or clients providing auditors with inaccurate and incomplete data. This is consistent with the literature which revealed that auditors often struggle with obtaining data to analyse from clients or obtain data that is incorrect or irrelevant (Earley, 2015; Liew et al., 2022).

Interestingly, the findings also revealed that auditors face another challenge when using data analytics, where both the audit firms and the clients are still resistant to the change brought by data analytics in the financial value chain. Firm C and Firm D believe that changing the mindset around data analytics will result in much more utilisation of data analytics in an audit.

4.4 Improvement Required in the Utilisation of Data Analytics

4.4.1 Question

Are you of the opinion that there is room for improvement in how audit teams utilise data analytics in the audit process? If you answered yes, please provide suggestions.

4.4.2 The Objective of the Question

This question aimed to determine whether participants felt there was an opportunity for improvement in how audit teams use data analytics.

4.4.3 Presentation of Findings

The participants revealed the following in response to this question (Table 4).

4.4.4 Interpretation of Findings

Figure 2 indicates that 100% of the participants provided a definitive answer to the question, stating that they, without a doubt, believe there is room for improvement in how audit firms utilise data analytics in their audits. In the literature it was noted that auditors default to not using any data analytics tools when they are presented with a

Table 4 Improvement required in the utilisation of data analytics

Participant	Feedback from participant
Firm A	Yes definitely. Looking back at when I was a trainee, the changes have been exponential. However, with the direction that the firm is moving in (i.e. data driven audits), there is still room for improvement. This would include getting bespoke analytics more broadly adopted, getting complete buy in from leadership and just general improvement in analytic tools and applications available.
Firm B	Yes. There needs to be a bigger shift away from traditional procedures which typically rely on statistical and non-statistical sampling to DA [data analytics] routines however this is only possible if the following are in place: • The risk assessment process needs to be data led with traditional procedures supplementing this. If the right risk is identified, it is easier to design an appropriate audit response. • The client needs to understand their data and be able to provide it in an appropriate format. • The auditing standards need to provide more guidelines on how to deal with stratified populations and outliers identified when using DA routines. • Audit teams need to be more familiar on how to work with data and perform D&A routines. • Audit regulators need to understand and treat the performance and evidence obtained from DA routines with the same level they do traditional audit procedures. This will in turn give confidence back to the audit teams and enhance and proliferate the use of D&A in the audit.
Firm C	Yes. The extent to which data analytics is used can be improved. We have the ability to create analytics to suit all types of risks, but this is not always identified. Audit teams can challenge themselves more around building custom analytics for different clients.
Firm D	There is always room for improvement. With more data becoming more regularly available, you can create even more efficiencies on the audit and vastly automate the audit further. The short-term focus is on the extraction of even more data from clients. We call this creating a data platform through “hooking up the pipes” to our clients. This area is receiving a lot of focus within the form both locally and globally. Many more standardised data acquisitions/transformation routines and digital assets are being built in a coordinated way that lends itself to quick insights, audit automation and longer-term efficiency gain in executing the audit. At firm D we focus on this as our client’s technology changes. Our audit teams are becoming more equipped in building bespoke client analytic solutions using the tools they have been trained on. Although many solutions are produced, the initial time investment is significant, and teams are learning how to design and build the solutions in a shorter timeframe.

Source: Author’s own compilation from accumulated data obtained verbatim from respondents

wide range of data analytics tools to choose from (Brazel et al., 2022; Huang et al., 2022; Krieger et al., 2021). The participants indicated that one way in which audit firms can improve on how they adopt data analytics is by ensuring that tailored data analytics are created to suit the different types of engagements and that when these data analytics tools are made available by the firms, audit teams do utilise them in their respective audits.

As the literature and findings suggest, one of the difficulties firms encounter when using data analytics is struggling to obtain good quality data to analyse from clients

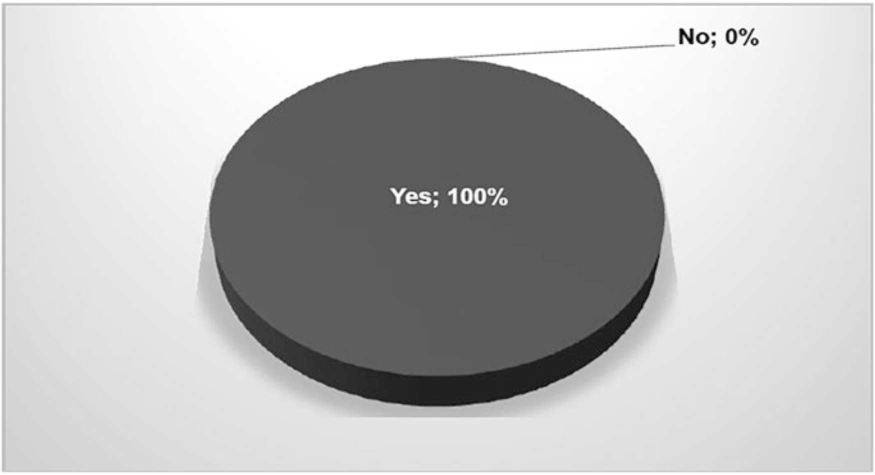

Fig. 2 Definitive response to question: Is there improvement required in the utilisation of data analytics? Source: Author's own compilation

or obtaining data that is incorrect or irrelevant (Earley, 2015; Liew et al., 2022). One of the suggestions on improving how firms utilise data analytics, Firm B revealed that "clients need to understand their data and be able to provide it in an appropriate format."

4.5 Impact of Data Analytics on Audit Quality

4.5.1 Question

Do you think that using data analytics to audit financial statements enhances audit quality? Please justify your answer.

4.5.2 The Objective of the Question

This was important, as it sought the participants' views about whether they believe utilising data analytics in the audit process enhances audit quality.

4.5.3 Presentation of Findings

The participants revealed the following in response to this question (Table 5).

Table 5 Impact of data analytics on audit quality

Participant	Feedback from participant
Firm A	It is my opinion that data analytics enhances audit quality. This is because data analytics gives us a much more holistic understanding of our clients (the composition of transactions and balances), their data as well as their processes. Through this you are able to get far greater comfort that sample based testing can provide. Further through our improved understanding of the composition of the respective balances we more in tune with where the actual risk lie (this is because we are able to look more into the composition of the actual balance, and consequently can adopt better profiling and identification of our risks).
Firm B	Yes, refer to the comments above
Firm C	Yes. The use of data analytics also allows us to assess 100% of the population instead of a sample. This allows auditors to provide an improved level of assurance. Analysis of trends also allows for better risk identification.
Firm D	Yes. Firm D strives to continue to improve quality and that is why we continue to make greater use of data analytics. Simplistically, greater coverage is achieved, leading to deeper discussions with clients through appropriate visualisations.

Source: Author's own compilation from accumulated data obtained verbatim from respondents

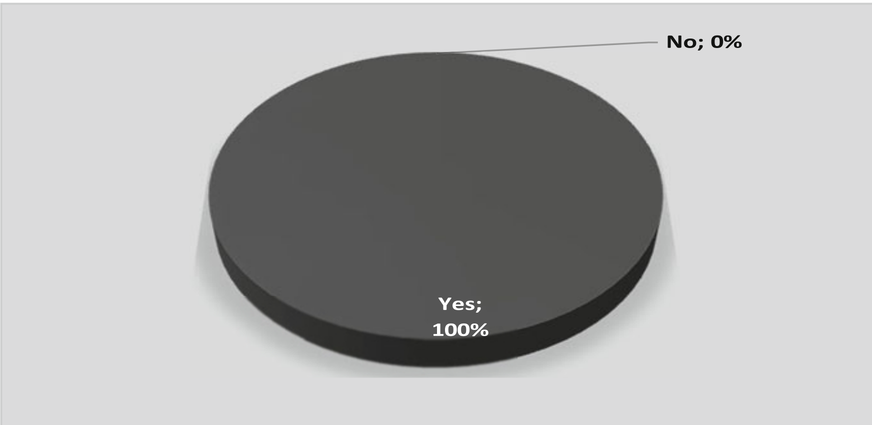

Fig. 3 Definitive response to question: Does the use of data analytics enhance audit quality? Source: Author's own compilation

4.5.4 Interpretation of Findings

The findings, similar to what was found in the literature reviewed, revealed that 100% of the participants (Fig. 3) unanimously believe that using data analytics in auditing financial statements enhances audit quality. Firm A and Firm C elaborated on their responses and stated that data analytics enable auditors to detect and analyse misstatement risks, leading to a better-quality audit. Firms C and D also stated that because data analytics make testing 100% of the population possible, auditors perform a better-quality audit than traditional sampling methods. This result agrees with literature presented, where it was reported that using data analytics in an audit increases audit quality (De Santis & D'Onza, 2021).

5 Conclusion

The basis on which auditors perform their audits has not fundamentally changed, even with the introduction of data analytics and the Fourth Industrial Revolution. The literature review and empirical data found that there is a noticeably growing trend of auditors utilising data analytics in audits and that all phases of the audit process can incorporate data analytics. Data analytics provide various benefits to the auditor and that even though the use of data analytics provides benefits, it also provides unique challenges. Furthermore, the study highlights that The Fourth Industrial Revolution, a term used to describe recent technology breakthroughs, has impacted how audit firms conduct financial statement audits.

It was determined that data analytics provide various benefits to the auditor and that even though the use of data analytics provides benefits, it also provides unique challenges that auditors need to overcome. Similarly, the study found a positive link between the use of data analytics and the outcomes of regulatory inspections. The empirical study revealed strong evidence that there are notable audit quality concerns in South Africa, which have been attributed to a failure in audit quality, and that auditors are using data analytics to overcome these concerns. The study concluded that using data analytics in an audit enhances external audit quality.

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Financing of Higher Education Institutions in Africa: A Systematic Literature Review and Call for Action

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Abstract Higher Education Institutions (HEIs) are the centre of scientific and innovation activities. Therefore, it is vital that the higher education sector, most importantly undergraduate sections, which play a valuable role in society, be financed adequately. Undoubtedly, countries that increase their scientific research by funding the development of higher education are at the forefront of global competitiveness. On the contrary, the narrative on African higher education has excessively exhibited a deficit and crisis in students' access to funding, quality, excellence, and equity. Current examples of funding challenges in the African higher education sector were discussed in this research, and suggestions were advanced. This study assesses multiple forms of funding for HEIs in Africa. The study adopts an interpretivist qualitative approach and uses the Systematic Literature Review (SLR) method to collect relevant data. The study surveyed 39 studies from different research outlets, including the most ranked publishers, namely, SAGE, Wiley, Sprinter, Elsevier, Taylor & Francis, and Inderscience. The preferred reporting items for systematic reviews and meta-analysis (PRISMA) guidelines were used to guide the reporting of this review. PRISMA provides a structured approach for researchers to transparently report the methods, results, and conclusions of their systematic reviews and meta-analyses. Systematic reviews aim to summarize and analyse the existing evidence on a specific research question by identifying, appraising, and synthesizing relevant studies. The review found that despite the significant expansion of higher education in Africa, the sector remains one of the most financially challenged in the world, particularly in the aftermath of the COVID-19 pandemic. The financial challenges have implications for every facet of the higher

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education landscape, particularly quality, excellence, and equity. The researchers identified that the most recurring avenues for financing the higher education sector in Africa are public resources, university-industry corporations, and funding with private resources. The current study contributes to the discourse on challenges of funding that persist in the African higher education sector and attempts to provide open insights for higher education practitioners, policymakers, and academicians.

Keywords Africa · Financing · Funding · Higher education · Higher education institutions

1 Introduction

Higher education is crucial in driving social and economic development, particularly in Africa, where Higher Education Institutions (HEIs) are underdeveloped and have been a low priority for the past two decades (Mugimu, 2022). It equips individuals with the skills and knowledge necessary to foster innovation, promote sustainable growth, and address complex societal challenges (Hoidn & Kärkkäinen, 2014). Most HEIs require students to pay for the services and training offered to them either directly by the student or indirectly through a third party. Therefore, adequate and sustainable funding for HEIs is essential for the quality and accessibility of education and for a country's economic performance (Grant, 2017; Oketch, 2016).

Research has shown a positive correlation between countries that adequately fund their HEIs and their economic performance. Investing in higher education contributes to the development of a skilled workforce, which is a vital driver of economic productivity and competitiveness (Grant, 2017; Krstić et al., 2020). Countries that prioritise higher education funding tend to experience higher rates of innovation, technological advancement, and entrepreneurship, leading to increased job creation, foreign investment, and economic growth (Krstić et al., 2020; Trinh, 2023).

At the institutional level, well-funded HEIs at undergraduate level attract and retain highly qualified faculty members, who in turn provide quality education and engage in cutting-edge research and development activities. This research output often leads to innovation, patents, and the commercialisation of ideas, all of which contribute to economic growth, industry development, and solid industry-academic collaborations (Krstić et al., 2020). HEIs equipped with state-of-the-art facilities attract both local and international students, fostering cultural exchange and providing countries with a competitive advantage in the global education market (Oleksiyenko et al., 2021).

Countries that prioritise higher education funding also tend to have higher educational attainment rates, contributing to individual income growth and poverty reduction (Oleksiyenko et al., 2021). Besides poverty reduction, a highly educated workforce enables countries to attract high-value industries and knowledge-intensive investments, further bolstering economic performance.

Despite the benefits and developmental possibilities linked to adequate funding of HEIs, many African HEIs lack sufficient funding. The higher education sector in different African countries struggle to receive the UNESCO-recommended minimum 26% of the education sector's budgetary allocation (Teferra, 2013; UNICEF, 2021).

By shedding light on the economic benefits of adequately funding HEIs and providing actionable recommendations, this review aims to contribute to the ongoing discourse on sustainable and inclusive educational financing. Recognising the crucial role of higher education in driving economic growth, African countries can leverage adequate funding for HEIs as a catalyst for transformative development, fostering innovation, and creating a prosperous future for the continent.

2 Problem Statement and Study Objective

The financing of HEIs in Africa poses a significant challenge that hinders the quality and accessibility of education (Mbithi et al., 2021; Omona, 2012). Many African countries struggle to allocate adequate and sustainable funding to their HEIs, resulting in funding gaps, overcrowded classrooms, outdated infrastructure, and a lack of quality learning resources. Insufficient funding negatively impacts the academic performance of HEIs and perpetuates inequalities in educational opportunities (Lawrence et al., 2020). This study therefore addresses the following objectives.

- To examine the existing literature on the financing of HEIs in Africa,
- To explore the finding dimensions of HEIs in Africa
- To examine whether funding promotes academic performance of HEIs
- To identify gaps and challenges in HEI financing in Africa.

By synthesising and analysing previous studies, this review aims to provide a comprehensive overview of the financing dimensions, including public funding, private investments, tuition fees, scholarships, and international aid of HEIs focusing on the undergraduate.

3 Methodology

The study uses a Systematic Literature Review (SLR) methodology and an interpretivist qualitative strategy to gather pertinent information. This study conducted an SLR in accordance with the PRISMA guidelines of the literature review as a research methodology (Page et al., 2021). The PRISMA guidelines covers various aspects of the review process, including the identification of relevant studies, data extraction, study quality assessment, statistical methods used in the meta-analysis, and interpretation of results. The following actions were taken to guarantee a thorough and exacting analysis:

Identification of relevant literature: To locate pertinent studies published in peer-reviewed journals, conference proceedings, and reports, a thorough search of academic databases and research outlets, including SAGE, Wiley, Springer, Elsevier, Taylor & Francis, and Inderscience, was carried out. The search used a combination of keywords and search terms pertaining to the financing of HEIs in Africa.

After the preliminary search, an initial pool of 2552 unique contributions were yielded, including peer-reviewed journal articles, proceedings papers, books and book chapters, and other material such as book reviews, encyclopedias, editorial materials, and reviews. Table 1 presents the results of the initial search by document type.

Search terms were defined to retrieve publications related to the financing of HEIs in Africa. For example, the following keys were used: "financing of higher education institutions," "financing of higher education institutions in Africa," "funding of higher education institutions," "funding of higher education institutions in Africa," and "financing of higher education institutions and academic performance."

Inclusion and exclusion criteria: Articles were reviewed for inclusion or exclusion based on established standards. The publications included in this study addressed a range of funding topics in Africa's HEIs, provided insight into the link between funding and academic achievement, and explicitly focused on the financing of HEIs in Africa. The search terms established were used for inclusion criteria.

After a preliminary screening, 910 articles were excluded. The first screening process involved the search for words. If one or more search words were present, the researchers included the articles. The next screening process involved the abstracts of the remaining 1642 peer-reviewed journal articles, using the pre-established inclusion criteria. These criteria aimed to address a range of funding topics in Africa's HEIs, provide insights into the link between funding and academic achievement, and explicitly focus on the financing of HEIs in Africa. After the abstract screening, a further 1603 articles were excluded as their focus was not on HEIs in Africa. Therefore, the final sample consisted of 39 impactful peer-reviewed publications. Table 2 presents the selected articles arranged by publication year on the financing of HEIs in Africa. Priority was given to open-access peer-reviewed research completed between 2010 and 2023 and published in English.

Data extraction: A standardised form was used to extract data from the selected publications. The following information was extracted from the selected publications: author, year of publication, the research aims, techniques, main findings, and suggestions pertaining to HEI financing in Africa.

Data synthesis and analysis: A thematic analysis method was used to find recurring themes and patterns within the selected publications. The compiled information was arranged in accordance with several financing factors, including government assistance, private investment, tuition fees, scholarships, and foreign aid. A comparative analysis of the literature was done to find patterns, variations, and gaps.

Table 1 Results of the initial search by document type for the period 2010–2023

Document type	SAGE		Wiley		Springer		Elsevier		Taylor & Francis		Inderscience		Total	
	No.	% of the total	No.	% of the total	No.	% of the total	No.	% of the total	No	% of the total	No	% of the total	No.	% of the total
Peer-reviewed journal articles	241	59.8%	189	64.3%	340	60.8%	289	65.7%	407	66.8%	176	71.3%	1642	64.3%
Proceedings papers	103	25.6%	78	26.5%	134	24.0%	96	21.8%	156	25.6%	67	27.1%	634	24.8%
Book chapters	34	8.4%	23	7.8%	56	10.0%	44	10.0%	32	5.3%	0	0.0%	189	7.4%
Book reviews	12	3.0%	4	1.4%	21	3.8%	5	1.1%	8	1.3%	0	0.0%	50	2.0%
Encyclopaedia	7	1.7%	0	0.0%	4	0.7%	6	1.4%	4	0.7%	2	0.8%	23	0.9%
Dataset	0	0.0%	0	0.0%	2	0.4%	0	0.0%	1	0.2%	1	0.4%	4	0.2%
Editorial materials	6	1.5%	0	0.0%	2	0.4%	0	0.0%	1	0.2%	1	0.4%	10	0.4%
Total	403	100%	294	100%	559	10%	440	100%	609	100%	247	100%	2552	100%

Table 2 Peer-reviewed articles on the financing of HEIs in Africa

No.	Author and publication year	Title	Country	Journal
1	Mgaiwa and Ishengoma (2023)	Financing higher education in Tanzania through students' loans scheme and its impact on equitable access	Tanzania	Heliyon
2	Gurgand et al. (2023)	Student loans: Credit constraints and higher education in South Africa	South Africa	Journal of Development Economics
3	Sebola (2023)	South Africa's public higher education institutions, university research outputs, and contribution to national human capital	South Africa	Human Resource Development International
4	Botlhale (2022)	Diversifying income streams in public higher education institutions in Botswana	Botswana	International Journal of Higher Education and Sustainability
5	Massango et al. (2022)	An assessment of higher education system and institutional policies alignment with sustainable development goals in Mozambique	Mozambique	International Journal of Higher Education and Sustainability
6	Gyamfi et al. (2022)	Financial development, institutional quality and inclusive growth in Africa	48 African countries	Global Business Review
7	Agyei and Idan (2022)	Trade openness, institutions, and inclusive growth in sub-Saharan Africa	39 African countries	SAGE Open
8	Thierry and Emmanuel (2022)	Does financial development increase education level? Empirical evidence from Sub-Saharan Africa (SSA)	SSA	Journal of Knowledge Economy
9	Hassan et al. (2022)	Education funding and learning outcomes in sub-Saharan Africa: A review of reviews	SSA	International Journal of Educational Research Open
10	Ogunji et al. (2022)	Higher education and the new normal: Implications for sustainable post COVID-19 era in Nigerian tertiary institutions	Nigeria	Cogent Education
11	Berchin et al. (2021)	How do higher education institutions promote sustainable development? A literature review	United nations (UN), of which Africa is a part	Sustainable Development
12	Bondzi-Simpson and Agomor (2021)	Financing public universities in Ghana through strategic agility: Lessons from Ghana	Ghana	Glob J Flex Syst Manag

(continued)

Table 2 (continued)

No.	Author and publication year	Title	Country	Journal
		Institute of Management and Public Administration (GIMPA)		
13	Ansong et al. (2021)	Addressing the burden of education financing in low and lower-middle-income countries: The role of savings accounts, cash transfers, and other income sources.	Sub-Sahara Africa	Journal of Family and Economic Issues
14	Lewin (2020)	Beyond business as usual: Aid and financing education in sub–Saharan Africa	SSA	International Journal of Educational Development
15	Tamrat and Teferra (2020)	Private higher education in Ethiopia: Risks, stakes and stocks	Ethiopia	Studies in Higher Education
16	Owusu-Agyeman and Fourie-Malherbe (2019)	Workforce development and higher education in Ghana: A symmetrical relationship between industry and higher education institutions	Ghana	Industry and Higher Education
17	Seetanah and Teeroovengadum (2019)	Does higher education matter in African economic growth? Evidence from a PVAR approach	18 African countries	Policy Reviews in Higher Education
18	Roopchund (2019)	Higher education challenges for public universities in Mauritius	Mauritius	International Journal of Management in Education
19	Matsolo et al. (2018)	Factors affecting the enrolment rate of students in higher education institutions in the Gauteng Province, South Africa	South Africa	Journal of Asian and African Studies
20	Panigrahi (2018)	Innovative financing of higher education: Changing options and implications	Multi-nation	Higher Education for the Future
21	Mgaiwa (2018)	The paradox of financing public higher education in Tanzania and the fate of quality education: The experience of selected universities	Tanzania	SAGE Open
22	Ilie and Rose (2018)	Who benefits from public spending on higher education in South Asia and sub-Saharan Africa? Compare	SSA	A Journal of Comparative and International Education
23	Buckner (2018)	The growth of private higher education in North Africa: A	Morocco and Tunisia	Studies in Higher Education

(continued)

Table 2 (continued)

No.	Author and publication year	Title	Country	Journal
		comparative analysis of Morocco and Tunisia		
24	George (2016)	Exploring the alternative sources of revenue for funding of public higher education in least developed countries – Implications for National University of Lesotho	Lesotho	International Journal of Education Economics and Development
25	Yirdaw (2016)	Quality of education in private higher institutions in Ethiopia: The role of governance	Ethiopia	SAGE Open
26	Oketch (2016)	Financing higher education in sub-Saharan Africa: Some reflections and implications for sustainable development	Sub-Sahara Africa	High Educ
27	Mgaiwa and Poncian (2016)	Public–private partnership in higher education provision in Tanzania: Implications for access to and quality of education	Tanzania	Bandung Journal of Global South
28	Odhiambo (2016)	Higher education in Kenya: An assessment of current responses to the imperative of widening access	Kenya	Journal of Higher Education Policy and Management
29	Tanner and du Toit (2015)	The influence of higher education institutions on the sustainability of ICT4D initiatives in underserved communities	South Africa	The Electronic Journal of Information Systems in Developing Countries
30	Goksu and Goksu (2015)	A comparative analysis of higher education financing in different countries	SSA	Procedia Economics and Finance
31	Akalu (2014)	Higher education in Ethiopia	Ethiopia	Higher Education Quarterly
32	Wangenge-Ouma (2012)	Tuition fees and the challenge of making higher education a popular commodity in South Africa	South Africa	Journal of Higher Education in Africa
33	Sanyal and Johnstone (2011)	International trends in the public and private financing of higher education	UNESCO of which Africa is a part	Prospects
34	Fahim and Sami (2011)	Adequacy, efficiency and equity of higher education financing: The case of Egypt	Egypt	Prospects
35	El-Araby (2011)	A comparative assessment of higher education financing in six Arab countries	Egypt, Morocco and Tunisia	Prospects

(continued)

Table 2 (continued)

No.	Author and publication year	Title	Country	Journal
36	Abdessalem (2011)	Scope, relevance and challenges of financing higher education: The case of Tunisia	Tunisia	Prospects
37	Nkrumah-Young and Powell (2011)	Exploring higher education financing options	North Africa region	European Journal of Higher Education
38	Odhiambo (2011)	Higher education quality in Kenya: A critical reflection of key challenges	Kenya	Quality in Higher Education
39	Tessema and Abebe (2011)	Higher education in Ethiopia: Challenges and the way forward	Ethiopia	International Journal of Education Economics and Development

4 Result

Study characteristics: A wide range of African nations, including Nigeria, Kenya, South Africa, Ghana, and Tanzania, were covered by the selected publications. The studies used a variety of methodologies, such as mixed-method, qualitative, and quantitative approaches, to understand the finance schemes and procedures used by HEIs in Africa.

Funding dimensions: The combined data showed numerous important funding aspects discussed in the literature. These comprised 'public funding': Several studies examined how much money the government spends on African HEIs. Moreover, many nations in the region were found to have issues with inadequate government support for higher education, with budgetary allocations frequently falling short of recommended standards.

Private investments: The growing role of private investments in HEIs, such as philanthropic gifts, corporate sponsorships, and public-private partnerships, was emphasised in the studies. These private funding sources were noted as potential means of enhancing the meagre assistance provided by the government.

Tuition fees: A recurrent subject in the research was the effect of tuition fees on HEI financing. The results showed that cost structures varied throughout nations, with some institutions depending on tuition fees as a source of income. In contrast, others viewed it as a hindrance to higher education accessibility and student affordability.

Scholarships and grants: As tools for assisting students and boosting the financial resources available to HEIs, the accessibility and efficacy of scholarships and grants were investigated. The research emphasised the significance of specific and all-inclusive scholarship programmes in fostering fair access.

Foreign aid: Several studies examined the role of donor finance and foreign aid in assisting HEIs in Africa. The results showed that different nations' HEI financing goals and tactics are shaped by varied amounts of support and their effects.

Academic performance: The relationship between funding levels and the academic performance of HEIs in Africa was a recurring theme across the studies. While studies found that institutions with adequate funding performed better academically, including higher graduation rates, improved research outputs, and improved student support services, they also noted that institutions with insufficient funding faced challenges like inadequate infrastructure, faculty, and research opportunities.

Gaps and challenges: The literature analysis uncovered several shortcomings and challenges in HEI financing in Africa. These included addressing concerns of affordability, equity, and accessibility in higher education, the necessity for increased government budgetary allocation and the diversification of funding sources.

5 Discussion

5.1 Objective 1: To Explore the Funding Dimensions of HEIs in Africa

The financial aspects of HEIs in Africa have drawn much attention and concern. Numerous studies have shown the various elements of funding in Africa. Oketch (2016) explores different approaches to financing higher education and their advantages and disadvantages. Oketch (2016) recommends exploring publicly funded ("free") university education models and workable strategies like fees and loans to increase participation and foster equity and quality. Due to competing demands for public funding and the need to spread the expense of higher education, Panigrahi (2018) emphasises the shift in HEI finance from public to private in emerging market nations, including Africa. This change has prompted the introduction of creative finance strategies in many nations.

The different facets of financing higher education in Africa have been the subject of numerous studies. For instance, Bondzi-Simpson and Agomor (2021) investigated how the Ghana Institute of Management and Public Administration handled a financial crisis by adopting an entrepreneurial strategy and commercialising academic services to raise money for long-term support. This study emphasised the need for strategic flexibility and the use of novel funding options to ensure the financial viability of HEIs in volatile situations. Oketch (2016) reviewed various financing schemes for higher education in sub-Saharan Africa's low-income nations and underlined the necessity to consider account alternative financing options, such as fees and loans, and highlighted the difficulties of publicly sponsored ("free") university education.

Sanyal and Johnstone (2011) examined the role of self-funding and the private sector in distributing the cost burden while analysing global trends in higher education financing. The authors suggested the possibilities of cross-border higher education and private-public partnerships for financing HEIs. El-Araby (2011) stressed the need for local characteristics and global best practices to direct reform initiatives by the government in search of new approaches to tackling financial issues in HEIs. In contrast to most African nations, South Africa has a tradition of cost-sharing in higher education (Wangenge-Ouma, 2012). However, persistent calls for "free" higher education, especially from black students, suggest financial obstacles to pursuing higher education (Wangenge-Ouma, 2012). Mgaiwa (2018) believes that public funding of universities is unstable and unsustainable in other nations, such as Tanzania.

Due to the gaps it creates between those who can afford higher education and those who cannot, financing higher education through the Students' Loans Scheme has resulted in social inequality in access to higher education (Mgaiwa & Ishengoma, 2023). The finance structures in various nations vary, with some depending more on public sector financing than others (Goksu & Goksu, 2015). Many low-income nations in sub-Saharan Africa have adopted the common policy of relying on international aid for education (Lewin, 2020). However, relying on grant funding and low-interest loans has become difficult due to the COVID-19 pandemic and its economic ramifications (Lewin, 2020).

Evidence of inadequate funding in many countries underscores the urgent need for increased government support. Insufficient financial resources can impede the development and growth of HEIs, limiting their ability to provide quality education, infrastructure, and student support services (Omona, 2012). To address this issue, policymakers should prioritise allocating adequate funds to HEIs, considering the potential long-term economic and societal benefits of a well-funded higher education sector (Compagnucci & Spigarelli, 2020).

5.2 *Objective 2: To Examine Whether Funding Promotes Academic Performance of HEIs*

Improving the standard of higher education in Africa requires an understanding of the link between funding and academic success. Numerous studies have examined this connection and its results. For instance, Thierry and Emmanuel (2022) looked at how the financial prosperity of sub-Saharan African nations affected education. Their research revealed that all levels of educational enrolment were favourably impacted by financial development. The influence of underfunding on the deteriorating educational standards in private HEIs in Ethiopia is highlighted by Yirdaw (2016). The report names obstacles that affect educational quality as things like a lack of trained teachers, inadequate facilities, and unfair regulatory settings.

Increasing infrastructure, teacher capability, and access to instructional aids—all of which have been linked to better student performance—require sufficient financing.

In order to improve academic engagement, foster students' employability skills, and support educational initiatives, Owusu-Agyeman and Fourie-Malherbe (2019) emphasise the significance of creating symmetrical partnerships between HEIs and the industry in Ghana. These studies highlight the importance of adequate finance to support quality education and foster relationships between HEIs and relevant industries.

Gurgand et al. (2023) note that access to financing has a big impact on higher education enrolment, especially for women in South Africa. The report contends that enrolment gaps are caused by women's poorer access to credit. According to a different study conducted in Tanzania (Mgaiwa & Ishengoma, 2023), increasing access to higher education through student loan financing has resulted in societal inequality. The report highlights the necessity for reliable funding channels to assist all needy candidates, irrespective of their socioeconomic status.

The effects of public-private partnerships (PPPs) on higher education access and quality in Tanzania are examined by Mgaiwa and Poncian (2016). The analysis demonstrates that PPPs have improved higher education access in Tanzania but have not significantly improved educational quality. The facilities, programmes offered by private universities, and academic staff's qualifications are some of the factors that contribute to quality issues. In addition, Ouedraogo et al. (2022) argue that institutional quality is essential for fostering the growth of human capital and expanding access to education. It is critical to examine systematic methods for interventions that cover several sectors and ensure complementary inputs (Hassan et al., 2022). Oketch (2016) underlines the necessity of funding higher education in order to support economic development and emphasises the need to avoid producing a large number of unemployed graduates.

According to studies, schools with sufficient resources have superior academic results, such as higher graduation rates, increased research results, and improved student support services (Krstić et al., 2020; Oleksiyenko et al., 2021). On the other hand, institutions with tight budgets frequently struggle with infrastructure issues, a lack of qualified professors, and constrained research opportunities. These results emphasise how crucial appropriate funding is for HEIs to maintain and raise academic performance. Adequate financial resources enable institutions to attract and retain high-quality staff, provide modern infrastructure and resources, and invest in research and innovation, all of which contribute to improved educational outcomes. Recognising the positive correlation between funding and academic performance, policymakers should prioritise investing in HEIs to foster educational excellence and drive national development.

5.3 *Objective 3: To Identify Gaps and Challenges in HEI Financing in Africa*

Several gaps and challenges with HEI financing in Africa must be resolved. In their study of cost-sharing arrangements between governments and families in low-income nations, Ansong et al. (2021) analyse how households pay for their share of the costs of post-secondary education. Their survey found that people with savings accounts are more likely to devote money to education. It implies that fostering financial inclusion and boosting accessibility to formal savings services can aid families in putting money aside for their children's education. Gyamfi et al. (2022) emphasise the significance of robust regulatory and institutional frameworks in ensuring financial development results in inclusive growth. Agyei and Idan (2022) emphasise the function of institutions in enhancing the beneficial connection between equitable growth and trade openness in sub-Saharan Africa.

According to these studies, resolving institutional flaws and strengthening regulatory frameworks is crucial for long-term funding and inclusive growth in HEIs. Berchin et al. (2021) posit that HEIs must do more to advance sustainable development through knowledge generation, research, education, and community involvement. Tanner and du Toit (2015) wrote about the relevance of sustainability in closing the digital divide and the role of HEIs in promoting ICT for development efforts.

In his assessment of public spending on higher education in Tunisia, Abdessalem (2011) highlighted the necessity for public policy to design orientations and programmes that promote quality and efficiency while cost-cutting. Maintaining public funding for higher education is significantly hampered by budgetary restrictions and rising student enrolment. In addition, the problem of equity in finance presents another challenge. El-Araby (2011) examined the higher education financing plans in six Arab nations and evaluated how equitable resource distribution would be affected and concluded that providing people who cannot afford an education with equal access to high-quality education is a vital objective that necessitates creative financing methods.

Fahim and Sami (2011) focus on Egypt's challenges with higher education funding. In addition to examining the effects of demographic shifts, the demand for high-quality education, and the shift to private provision, the study explores the sufficiency, effectiveness, and equality of public spending on higher education. It suggests different approaches to dealing with the funding issue and provides equal access to high-quality education.

The COVID-19 epidemic highlighted the African HEIs' lack of e-learning implementation readiness, insufficient funding, and logistical difficulties (Ogunji et al., 2022). In addition, risks associated with policy and regulation, funding, teaching and learning, infrastructure, and research are present in both public and private HEIs in Africa (Tamrat & Teferra, 2020). These challenges have led some countries to become overly dependent on external assistance to fill the gaps in education finance, which is not sustainable in the long run (Lewin, 2020).

The selected literature demonstrates the complexity of HEI finance in Africa. Adequate finance is essential to improve academic success, guarantee quality education, encourage inclusive growth, and support sustainable development. To ensure sustainable and equitable HEI finance, addressing the highlighted gaps and issues, such as unstable funding sources, underfunding, a lack of competent instructors, and institutional flaws, is necessary. To improve the quality and accessibility of higher education in Africa, policymakers, regulators, HEIs, and stakeholders should collaborate to create efficient funding models, upgrade institutional frameworks, and encourage collaborations between HEIs and pertinent industries.

6 Limitations and Prospects for Future Studies

The literature review was limited to studies published between 2010 and 2023, aiming to capture recent research. However, this timeframe may have missed earlier studies that provide valuable historical insights into HEI financing in Africa. Including studies from a broader timeframe would enhance the temporal understanding of the subject. In addition, while the review encompassed studies from various African countries, it is essential to note that the findings may not fully represent the entire continent. Another limitation of the study is the scope of data collection which relied solely on peer-reviewed literature without recourse to other forms of data collection, such as primary or secondary data collection and analysis.

A valuable avenue for future research is conducting comparative analyses of HEI financing across multiple African countries. This approach would provide insights into similarities, differences, and best practices in funding models, enabling the identification of effective strategies and policies that can be adapted or replicated in other contexts. In addition, qualitative investigations, such as case studies and interviews, can capture the perspectives and experiences of key stakeholders involved in HEI financing. These qualitative insights could provide a nuanced understanding of the challenges, successes, and potential solutions for HEI financing in Africa.

7 Conclusion

This study explored various dimensions of funding and their relationship with HEIs financing. It identified gaps and challenges in the current funding landscape and highlighted the importance of adequate funding for academic success. The study followed the PRISMA guidelines to ensure transparent reporting and improve the overall quality of the research. The main funding sources were public funding, private investments, tuition fees, scholarships and grants, and international aid. Adequate funding was closely linked to improved academic performance, as institutions with sufficient resources demonstrated better graduation rates, research outputs, and student support services. This study contributes to the existing body of knowledge on HEI financing in Africa and highlights the importance of adequate funding for academic success. Future research should focus on exploring innovative financing approaches and evaluating the impact of funding interventions on educational outcomes and socioeconomic development.

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Attitudes of Accounting Students Towards Ethics and Ethics Education

Stephanie Venter and Vanessa van Dyk

Abstract The cost of unethical behaviour in both the private and public sectors is astronomical. In South Africa, the Auditor-General and accounting professional bodies have received widespread public criticism for failing to uphold their duty to protect stakeholders and the economy from the impact of these ethical failures. Such failures are exacerbated by the mismatch between the rapid advances in technology and the slow pace of regulation. The literature makes clear how crucial and complex ethics are and that effective ethics education is critical to curb unethical behaviour. The South African Institute of Chartered Accountants (SAICA) has charged higher education institutions with the duty of providing effective ethics education as part of accounting education. Attitudes towards a field of study show a strong correlation with academic performance and future behaviours. Consequently, negative attitudes towards ethics and ethics education carry the risk of poor engagement with content and may weaken the intended impact of the educational initiative. The objective of this study is to examine accounting students' attitudes to ethics and ethics education through a quantitative approach. Thus, a survey was administered to accounting students at a school with SAICA accreditation. The results reveal that the participants' interest in ethics, and their conversational engagement with it, are strong. The participants reported a high level of comfort, enjoyment, and belief in ethics education. Furthermore, the analysis revealed that the participants had a positive attitude towards ethics and ethics education, derived from the strong sense of significance and relevance they accorded to ethics.

Keywords Attitudes to learning · Business ethics · Ethics · Ethics education · Ethics in accounting

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1 Introduction

1.1 Ethics in the Spotlight

In recent years, emphasis has been placed on the value of ethics as well as the consequences of a lack of ethics. Dishonest and careless business practices have bred mistrust among stakeholders (Weibel et al., 2020). Globally, this level of distrust has increased due to major corporate scandals such as Enron, Merrill Lynch and Martha Stewart in the United States, and Cadbury Nigeria Plc, Spring Bank Plc and Wema Bank Plc in Nigeria, to name a few (Ogbodu & Umoru, 2018). In South Africa, this trust has also been eroded by a string of high-profile corporate scandals such as Standard Chartered, SAP, Transnet, McKinsey, HSBC, KPMG, Eskom, BOSASA, Gold Fields, Tongaat Hulett, VBS Bank and Steinhoff (Business Insider, 2020; Nyamakanga & Diphoko, 2017; The Economist, 2017).

As we enter the Fourth Industrial Revolution, the accounting profession has a greater awareness of the importance of making ethical decisions. The rapidly emerging advances in technology will undeniably have a positive impact on the profession; however, these same technologies may also jeopardise critical ethical values. Values such as fairness, privacy, independence, beneficence, accountability, and responsibility have all been flagged as 'at risk' by the Big 4 audit firms, Deloitte, KPMG, PricewaterhouseCoopers and EY. These concerns have been echoed by smaller firms as well (Munoko et al., 2020). If ethics are considered at risk, then technologies such as quantum computing pose a great danger to finance and accounting in the form of encryption breaking of data and its misuse (MacPherson, 2021). While unethical behaviour causes businesses to lose approximately 5% of revenue each year (University System of Georgia, 2019) the financial impact of ethical values compromised through technology remains unknown.

In the educational sphere, the high incidence of academic dishonesty in online assessments has highlighted the need for student ethics education. The regulations imposed because of the COVID-19 pandemic necessitated a move to an online educational environment (Sangster et al., 2020). Online learning settings are linked to advantages such as greater accessibility and lower educational costs (Larmuseau et al., 2019). However, this same technology that spans social divides also has negative impacts, such as low student engagement, lack of discipline and academic dishonesty (Sithole et al., 2019).

Ethics has universal relevance. Education in ethics is necessary for an individual's personal growth as well as their full participation in democratic society. Both every day ethical decisions as well as more complex moral dilemmas difficulties requires ethical reasoning (Nussbaum, 2010). A response to this important challenge in the context of accounting education at university is therefore essential.

1.2 Responses to the Ethics Challenge

In response to the corporate scandals worldwide, there has been a noticeable increase in regulation imposed by governments and regulatory bodies. For example, in the United States, the Sarbanes–Oxley Act (2002) was introduced, which included the establishment of the Public Company Accounting Oversight Board. In the United Kingdom, the Cadbury Report of 1992 (Cadbury Report, 1992) was implemented as well as the Audit Firm Governance Code (Financial Reporting Council, 2016). The Netherlands implemented a two-tier board structure, as required by the Dutch Corporate Governance Code (Bendixen & Thomas, 2000), while South Africa introduced best practice recommendations in the form of the King IV Code of Corporate Governance (Institute of Directors in Southern Africa, 2016).

Despite the implementation of comprehensive codes of conduct (Arjoon, 2000) and robust legislation to combat fraud, new waves of corporate scandals continue to surface (Fang et al., 2022). If increased regulations had been able to solve the problem, the benefits would certainly have been evident by now. This is because integrity goes beyond simple compliance with regulations (Kermis & Kermis, 2014) indicating that students need to be equipped with education.

When introducing ethics as a subject to students, it is crucial that they comprehend its significance as well as the reasons why rules and guidelines are necessary. The eventual limitations of the regulations are also an important aspect that needs to be examined. Therefore, ethics education is an important aspect in the accounting arena, together with the allocation of the responsibility thereof.

Ethics education is an important response to the challenge of ethics discussed earlier. It is widely agreed that accounting education, both undergraduate and postgraduate, must prepare future accounting executives to be honest, trustworthy and have the highest level of personal integrity (Kermis & Kermis, 2014). Psychologist, Martin Bloom, issued a warning as far back as 1981 that certain values will be imposed on society by future events if discernible values such as integrity and trustworthiness, are not consciously enforced now (Kermis & Kermis, 2014).

Ethics education is also essential for global relevance and employability of graduates. Within the context of employability after completing accounting education, both technical skills as well as reasoning and practicing ability are required (Mourik & Wilkin, 2019). Threshold capabilities for vocational accounting training are noted as critical analysis, communication, knowledge, problem-solving, teamwork, self-management, and judgement. Judgement is explained as "[e]xercising judgement under supervision to solve routine accounting problems, with appropriate use of perspectives (social, ethical, economic, regulatory, sustainability, governance and/or global)" (Mourik & Wilkin, 2019, p. 317). Most modern university degrees include the development of employability skills as a requirement for graduation (Cotronei-Baird, 2019).

The South African Institute of Chartered Accountants (SAICA, 2019) aligns with this practice through the inclusion of these capabilities in its 2025 Competency Framework. Moreover, based on the framework provided by International Education

Standard 3 (IES3) and International Education Standard 4 (IES4), the International Federation of Accountants (IFAC, 2019) established a competency framework or map that its members should adhere to. SAICA uses this competency framework to accredit higher education institutions (HEIs) to ensure that the required education, including ethics education, is taught in HEIs. This aim has been reinforced thanks to a recent review (SAICA, 2019). Therefore, in South Africa, the responsibility of ethics education for accountants lies with HEIs.

To craft appropriate responses to the importance of ethics and the challenge of the widespread unethical behaviour in business, the current state of ethics education must be considered. The literature suggests that accounting students perceive existing ethics education as being too theoretical (Lubbe, 2021). There are numerous opportunities and methods to provide a more effective ethics education, and these should therefore be explored.

1.3 Opportunities in Teaching and the Importance of Attitudes

When it comes to ethics education, what matters is not only what is taught, but how it is taught. In a study assessing the effectiveness of ethics interventions, it was concluded that educators need to find methods of learning that are precisely designed to advance moral development before standardising educational approaches (Ponemon, 1993). This educationalist angle opens an opportunity for reformist work towards the effective teaching of ethics education. Amid the Fourth, and even the emerging Fifth Industrial Revolutions, online learning and gamification experiences offer a scalable opportunity for learning (Mhlanga & Moloi, 2020).

The theory of planned behaviour is a psychological theory that connects attitudes and actions. According to the theory, an individual's behavioural intentions are shaped by three fundamental factors: attitude, subjective norms, and perceived behavioural control (Ajzen, 1991). In building towards improved curriculum and improved learning, attitudes are important. A positive attitude contributes to improved learning (Mazana et al., 2019; McKenzie, 2010; Osborne et al., 2003). Therefore, it is valuable to understand the attitudes of accounting students to ethics and ethics education before developing tools and standardising approaches.

1.4 Aim of the Study

The concerns regarding an unethical climate in accounting networks, that make up audit firms, the Government, the Auditor-General, and the relevant professional bodies, needs to be addressed. The expectation is for ethics education to be addressed at HEI level. Moreover, the negative attitudes of accounting students towards ethics and ethics education could undermine the proposed educational process of ethics in accounting.

The aims of the study are to describe the context of the ethics challenge and the relevance and importance of business ethics, followed by the examination of the responsibility, effectiveness and approach to ethics education in the accounting profession. The study then aims to survey the attitudes of accounting students towards ethics and ethics education, to examine the risk of poor engagement in ethics education due to negative attitudes.

2 Literature Review

2.1 Importance and Relevance of Ethics

In business, ethics are relevant and crucial. To manage the diverse interests in the corporate environment, a solid code of ethics is required. As noted, the prevalence of fraud and unethical behaviour in the commercial sector, the public sector and the accounting network has highlighted the need for a robust response to strengthen ethics. The opportunistic behaviour that resulted from COVID-19 restrictions, coupled with the explosive development of new technology have made matters worse. These factors jointly heighten the need for a stronger emphasis on business ethics.

2.1.1 The Ethics Climate

a) Private sector

A series of business scandals have marred South Africa's corporate sector over the previous decade, each revealing a clear lack of ethics (Business Insider, 2020). These high-profile corporate scandals include Standard Chartered, SAP, Transnet, McKinsey, HSBC, KPMG, Eskom, BOSASA, Gold Fields, Tongaat Hulett, VBS Bank and Steinhoff (Business Insider, 2020; Nyamakanga & Diphoko, 2017; The Economist, 2017). Such behaviour has left a blight on the accounting profession. After a temporary lull in such unethical behaviours in 2019, the observed wrongdoings have resumed. According to global data, only one out of every seven employees works in an environment with a strong ethical culture. Both the global median for pressure to compromise standards and the rate of retribution have reached new highs (Ethics and Compliance Initiative, 2021).

b) Public sector

The impact of unethical behaviour in the public sector is profound. This behaviour infringes on the economic, social and cultural rights of individuals as well as their rights to development and a healthy environment (Union of International

Associations, 2021). Recent instances of unethical behaviour in South Africa have highlighted the relevance and importance of business ethics. A well-publicised example of unethical behaviour in the public sector is the government's relationship with the Gupta family (Business Insider, 2020). A database of stolen emails between Gupta family members and numerous senior South African state officials revealed the degree of the family's alleged power over the state's operations. The emails also revealed how the family were supposedly able to persuade authorities and important political appointments to achieve their objectives. The Guptas were accused of meddling in cabinet selections, using their influence on secure major contracts from state-owned businesses and organising a campaign of propaganda throughout the country (Business Insider, 2020).

Unethical behaviour at a municipal level is also prevalent. According to the Auditor-General, Tsakani Maluleke, the finances of local governments are under strain, with municipalities reporting R26 billion in irregular expenditure in the 2019–2020 financial year (Maluleke, 2021). The fact that only 27 of the 257 municipalities across the country earned clean audits reflects the worsening financial condition. Notably, 89 municipalities were unqualified, 66 municipalities were qualified, six municipalities were unfavourable and 12 municipalities were disclaimed, while audits in 57 municipalities were not finished. There were findings in both the unqualified and qualified audits (Felix, 2021).

Other than the many international legal instruments designed to curb corruption, South Africa has manifold local legislative responses; however, these do not seem to be sufficient to drive out the systemic corruption in our political spaces (Mubangizi, 2020). The Corruption Perceptions Index ranks the perceived levels of corruption in the public sector in 180 countries around the world, with a ranking closer to 1 being the least corrupt. In 2020, South Africa was ranked 69th out of 180 countries, after ranking 70th in 2019. Further findings in this report suggest that corruption not only jeopardises the global health response to COVID-19, but also leads to a lingering democratic crisis (Transparency International, 2019, 2020).

President Cyril Ramaphosa noted in October 2019 that the cost of corruption in South Africa has been as much as R1 trillion (Ramaphosa, 2019). This is a huge waste of government money at a time when the South African economy is in distress, experiencing slow growth and credit downgrades (Smith, 2020). In South Africa in 2020, 22 million tax payers jointly paid R528 billions of their hard-earned money to the fiscus with the largest source of income for the South African Revenue Service being personal income tax, which accounted to R1.25 billion. The Auditor-General issued a press statement on 31 March 2021, urging the government to deliver audit outcomes that are sustainable (Maluleke, 2021). Maluleke emphasised in the 2019/2020 general report on national and provincial government spending that accountability failures must be taken more seriously. According to the same study, irregular expenditure for the year totalled R54.34 billion. Because full quantities were not published, this figure might be up to 31% higher. The report also mentions that the year-end balance of irregular expenditure that had built up over several years and had still to be dealt with, was R262.3 billion (Du Plessis, 2021).

Other than the high cost of unethical behaviour to the public and private sectors, unethical behaviour is also eroding the value of the accounting profession. Audit firms, the Auditor-General and accounting professional bodies have also been affected by such behaviour, which illustrates the importance of business ethics and the capability of effective ethics education to curb the impact on a wide base of stakeholders.

c) Accounting network

i) Audit firms

Audit firms are under immense pressure after many audit failures. The previous chief executive officer of the Independent Regulatory Board for Auditors, Bernard Agulhas, noted that many audit failures in South Africa were caused by a lack of auditor ethics, accountability, tone and other related behaviours, rather than a lack of technical competence. Lack of independence, a lack of professional scepticism and, in some cases, corruption, are examples of such behaviours (SAICA, 2020). This was echoed in a recent survey of accounting trainees who were lacking ethical leadership and training, as well as a restricted focus on ethics counselling and mentorship (Lubbe, 2021). The relevance and importance of business ethics is highlighted by behaviours such as these, and even more so in state institutions where exponentially more stakeholders are affected.

ii) Government and the Auditor-General

The concerning state of misconduct on a government level as discussed earlier, highlights the role of the Auditor-General of South Africa. The Auditor-General plays a vital role in accountability, thereby fostering solid financial governance practices in South Africa through its audit efforts. The role provides "independent assurance to various legislatures on whether entities that use public funds have managed their financial affairs in accordance with sound financial principles, complied with the relevant legal framework and provided credible information on the achievement of their financial and performance goals" (Auditor-General, 2021). South African elected representatives hold executive and accounting authorities, officials as well as public entities accountable in this way. The Auditor-General's work ultimately empowers citizens to hold the government accountable for it stewards public resources (Auditor-General, 2021). The state of government misconduct has heightened the need for accountability facilitated by the Auditor-General. The South Africa Corruption Report of 2020 indicated policing, public service, public procurement, and natural resources as high-risk areas for corruption (GanIntegrity, 2020).

iii) Professional bodies

Due to job losses and the erosion of savings, corporate failures cause enormous losses for South Africa's working class. SAICA believes that restoring the auditing profession's credibility is critical because this role could help resolve the socio-economic challenges that the country is experiencing due to corruption and business failures. It is worth noting that this issue affects the entire financial reporting environment, and focusing solely on the auditing profession will not fix the problem in the long term (Nomvalo, 2021). Those in charge of an organisation's governance must continue to do more to defend the public interest through significantly stringent financial reporting and improved controls (Nomvalo, 2021).

To sustain business success, 'trust' within business or economic activity needs to be protected. The risk is that transactions such as economic exchange for goods or services occur at the cost of this trust relationship with society (Rossouw, 2002). To mitigate this risk, most professions become more regulated through the establishment of regulatory bodies, professional bodies, frameworks, standards of conduct or codes of ethics. With regard to a moral framework for the accounting profession, the code of ethics of the International Ethics Standards Board for Accountants would be relevant as it was adopted by SAICA and the South African Institute of Professional Accountants. With limited regulatory guidance on the implementation of this code in businesses, each professional body has issued additional guidance for its implementation. The IESBA (2020) established a conceptual framework for all professional accountants to ensure compliance with its five identified principles of ethics, namely, integrity; objectivity; professional competence and due care; confidentiality; and professional behaviour. The IESBA revised its code of ethics in 2019. The changes that come into effect in 2021 are mainly a clarification on independence requirements and assurance engagement guidelines. These changes have even informed changes to the international standards of the International Auditing and Assurance Standards Board.

To improve the financial reporting environment, SAICA has embarked on several confidence restoration efforts, including coordinating conversations on audit reform. This comprises broad stakeholder engagement to determine the root causes of the audit expectation gap, the affected public trust and measures to remedy it (Nomvalo, 2021). The value that has been eroded from designations such as Chartered Accountant (South Africa) is not quantifiable. SAICA does not offer accounting education but rather accredits institutions against its framework to facilitate this education. The SAICA 2025 Competency Framework is therefore a key directive that teaching institutions need to implement. The changes in the framework aim to develop a more holistic graduate, and all spheres of ethics are now included, namely, personal, business and professional. SAICA (2021) is going as far as setting out the cognitive, behavioural and managerial requirements to achieve this competence. Although some have criticised the framework for becoming too technical, it is evident that the level of importance has escalated. Due to the relationship between the SAICA professional body and the accredited organisations, educators are required to take ownership of the framework to create methods and models to teach these competencies effectively.

2.1.2 Mismatch Between the Speed of Technological Advances and Legislation

For all the benefits that technology brings, it also means an exponentially larger negative impact in case of misuse. The speed of technological innovation, coupled with the lack of ethics, has necessitated a strong and clear response to address unethical behaviour in HEIs. This is because technological advances are not matched by regulatory advances (Marchant, 2011). This creates a gap that needs to be addressed through principle-based guidance. The speed of technological advances is explained by Moore's Law. This Law states that the number of transistors on a microchip, or in a dense integrated circuit, doubles every 2 years (Massachusetts Institute of Technology, 2020). Transistors are conductors that enable processing speed and capability (Awati, 2022). This essentially indicates that the processing speed of a computer doubles every 18 months to 2 years (BigThink, 2011). This forecast has held true since 1965. As a result, every software-reliant organisation operating in the age of the Fourth Industrial Revolution and the Internet-of-Things does so in an environment with rapidly changing information technology, which carries risk with it.

The lagging regulation of technological advancement has led to the prioritisation of technological ethics by national governments and multinational agencies, such as the European Union and the United Nations as well as professional standards organisations (Institute of Electrical and Electronics Engineers, 2020). Such issues require dialogue, interpretation and implementation (Kretzschmar & Bentley, 2013). Thus, oversight boards have been established by major technological corporations such as Google and Facebook. Growing public awareness and concern about how technology affects and interferes with our interpersonal relationships and societal institutions has resulted in an increase in demand for specialists who can evaluate and anticipate ethical issues related to technology development and use (Deschesne, 2020).

Thus, ethics are more relevant and more important than ever. Unethical behaviour is prevalent and requires further intervention. As previously noted, the response has been a heightened focus on regulation and education. However, increased regulation has not been sufficient to curb unethical activity. More needs to be done to raise awareness about ethics and ethical behaviour. An educational response needs to be considered.

2.2 Ethics Education as Part of Accounting Education

2.2.1 Ethics Can be Taught

The question, 'can ethics be taught?', has been brought up repeatedly, usually when people feel that their community, society, or nation's ethics have let them down. A meta-analysis of 25 corporate ethics education programmes found that activities emphasising students' cognitive abilities for ethical problem-solving and reasoning increased students' long-term ethical awareness (Waples et al., 2008). In another study, after a 10-week review of ethics cases, a pre- and post- defining issues test did not show any signs of improved moral development. This study by Ponemon (1993) attempted to test whether an ethics intervention improved the moral development and ethical behaviour of accounting students, but the findings seemed to contradict the premise that ethics can be taught. However, this must be considered along with the limitations of that study, which included the quality of the ethics case reviews, the mode of teaching and the outcome of 'moral development' being tested rather than 'applied ethics' (Ponemon, 1993).

Whether or not effective ethics education methods have been selected, De George (1999) states that there are moral pre-requisites for conducting business. No amount of education can ensure that all students will act morally since morality, whether in business or elsewhere, is always a question of human choice (Falkenberg & Woiceshyn, 2008). Therefore, it is important to emphasise to students that moral ambiguities and uncertainties occur in economic systems, businesses and interactions with many stakeholders. Instead of debating whether corporate ethics can be taught, the discussion should focus on improving the effectiveness of corporate ethics education (Falkenberg & Woiceshyn, 2008).

2.2.2 Regulation and Responsibility for Ethics Education

As noted in the introduction, the initial corrective response to unethical behaviour in business was the expansion of legislation, heightened focus on codes of conduct, revision of relevant professional codes, and notably, the industry relevant revision of IESBA's Code of Ethics (IESBA, 2020). This was followed by the revision of SAICA's Competency Framework for professional trainees and students (SAICA, 2021).

Improved regulation is however insufficient to change behaviour and thinking. While codes of conduct can be effective in promoting ethical behaviour (Buchholz & Rosenthal, 1998), they are limited because they were designed from a defensive standpoint to safeguard organisations (Betsy, 1996). Many codes are also either unimplemented (Lindsay et al., 1996) or unsuccessful (Kennedy, 1996). Consequently, codes of conduct and other forms of legislation alone, fail to noticeably curb unethical behaviour. Moral growth and development are also required (Poje & Groff, 2021), and ethics education is well suited to address moral growth and development. Jackling et al. (2007) support the improvement of ethics education as a possible solution to the accounting profession's ethical challenges.

Ethics education has been placed in the hands of educators and professionals. Regardless of existing narratives on the onus of instilling ethics, SAICA (2019) places the responsibility for ethics education in the chartered accounting profession with accredited HEIs. Hartman (2006) and Klein et al. (2007) concur that higher education needs to produce ethical professionals.

The revised SAICA CA2025 Competency Framework sets higher competence expectations. The 2013 Competency Framework only covered professional ethics and the only pervasive skills outcome related to ethics was "uses an ethical reasoning process" (SAICA, 2019, p. 14). The 2025 Competency Framework has expanded to all aspects of personal, business and professional ethics as well as citizenship. This expansion has occurred in content and on an advanced level of competence. Therefore, SAICA (2021) requires students to

> demonstrate an in-depth knowledge and rigorous understanding of the subject matter, apply the knowledge where the data is unstructured and/or is derived from multiple sources. Integrated thinking is required. Evaluate solutions for specified and implicit problems – applying a high degree of rigour and/or exercise sound judgement in making recommendations and formulating solutions. (p. 14)

2.3 Importance of Student Attitudes to Education

While it has been established that ethics education is a necessary response to the current ethics climate, it is important to address relevant considerations in attitudinal studies. An attitude is a person's learned predisposition to respond positively or negatively to an object, circumstance, concept or another person (Sarmah & Puri, 2014). Attitude therefore plays a role in predicting behaviour (Katz, 1960). There is a wide body of research on the benefits of a positive attitude in linguistics learning (McKenzie, 2010), science learning (Osborne et al., 2003) and mathematics learning (Mazana et al., 2019).

An in-depth examination of attitude reveals that it is linked to underlying psychological elements, such as needs, interests, feelings, beliefs and fundamental motivations (Gheorghe, 1998). This is supported by Ainley (2006), Dewey (1913) and Hidi (2006), who note that when one is interested, emotive responses, perceived value and cognitive processes all work together, and attention and learning come naturally. Belief about the importance and value of a topic determines interest and engagement. Enjoyment and comfort in an area of learning also has an impact, as demonstrated in attitude scales in biology learning (Russel & Hollander, 1975). The degree of challenge related to an experience also seems to have a direct impact on the attitude of a student towards the learning (Lee et al., 2021). Furthermore, the design of the questionnaires was influenced by suggestions from Blaikie (2000) for social research that included consideration of the worldview of participants. Research shows a strong correlation between the attitudes of students towards studies and their academic performance in various fields (Fennema & Sherman, 1976).

In summary, if accounting students have an interest in ethics and value this topic, it is expected that this will influence their views and attitudes towards ethics (Gheorghe, 1998). Moreover, if they believe the subject matter is important, it is likely that this will also influence their views and attitudes towards ethics education (Mager, 1968).

3 Methodology

This descriptive study uses a quantitative research approach and a positivist paradigm. The study gathered empirical numeric data through surveys to describe the attitudes of accounting students towards ethics and ethics education. The research strategy discusses where data is collected from. A descriptive, attitudinal study best addresses the research question by collecting data from a predetermined sample of people to learn more about the topic under investigation (Mouton, 2009). A survey strategy was deemed best suited because it would provide broad feedback. It is effective in collecting both structured and unstructured data. Although surveys have been criticised for lacking depth (Mouton, 2009), such a strategy can accommodate larger samples (Saunders & Tosey, 2013) and would therefore be well suited for large HEI classes.

The population of this study consists of accounting students receiving ethics education at SAICA-accredited institutions. As the researcher had permission to conduct research at the University of Johannesburg (UJ), the population was further refined to UJ students who fitted the criteria. The sample was the second-year Bachelor of Accounting students registered for the year module, Governance and Citizenship (GOV2AB01). At the time of the study, there were 1991 UJ students across all year groups registered as part of the SAICA-accredited programme at UJ, as confirmed by Lebogang Moemi, Faculty Officer at the College of Business Economics (Integrated Tertiary Software [ITS], 2022).

This study uses a non-randomised sampling method through judgemental or purposive sampling. When using this method, the researcher makes a judgement on participant criteria that would best address the research question (Quinlan et al., 2018). The focus of this study is on attitudes of accounting students towards ethics and ethics education. Therefore, this led to the selection of second-year Bachelor of Accounting students enrolled in a SAICA-accredited programme, receiving targeted ethics education for the first time in their academic careers. At the time of the study, the number of second-year students registered in a SAICA-accredited programme was 442 (ITS, 2022). This sample represents only 22% of the site population. While this is not a statistically significant sample and purposive sampling inherently holds the risk of perceived sample judgement bias, this non-randomised, purposive sample would still contribute sufficiently towards the aim of the study (Etikan et al., 2016). To mitigate any risks, care must be taken with the generalisability of the data in the conclusions. Participants were asked to voluntarily complete the questionnaires and anonymity from lecturer was preserved. A total of 185 students participated, representing a 42% response rate.

The time horizon relates to the point in time when the researcher conducts the research, producing either cross-sectional or longitudinal data. Cross-sectional research relates to a particular point in time, while longitudinal studies extend across an extended period (Saunders et al., 2012). The study was conducted towards the end of the first semester in 2022.

4 Findings

4.1 Ethics: Views and Attitudes and Level of Engagement

As noted in the literature review, the students' views, attitudes and level of engagement towards ethics were expected to influence their overall attitude towards ethics and ethics education (Gheorghe, 1998). The following questions were aimed at gauging this element:

On a 5-point scale ranging from 'Strongly agree' to 'Strongly disagree', rate the following statements:

- I consider myself to be ethical.
- Accounting students act ethically.

On a 5-point scale ranging from 'Always' to 'Never', rate the following questions:

- How often do you think about ethics?
- How often do you talk about ethics with your friends and family?

While 91% of participants consider themselves ethical (Fig. 1), only 79% think that accounting students act ethically most of the time (Fig. 2). Of the participants, 41% indicated that the perceive themselves as acting ethically often, while 38% indicated that they always act ethically. With an overwhelming majority of participants (91%) stating that they are ethical, it is expected that this would engender a positive attitude towards ethics (Gheorghe, 1998).

When asked to reflect on the ethics of their peers, as accountants themselves, the participants' assessment decreased to 79%. The respondents conveyed the perception that 41% of accounting students act ethically at times, 41% manage to behave ethically often and 38% of accounting students always act ethically. While 79% was still quite high, the difference between the perceptions of students' own ethicality and the ethical behaviour of other accounting students might be explained by self-

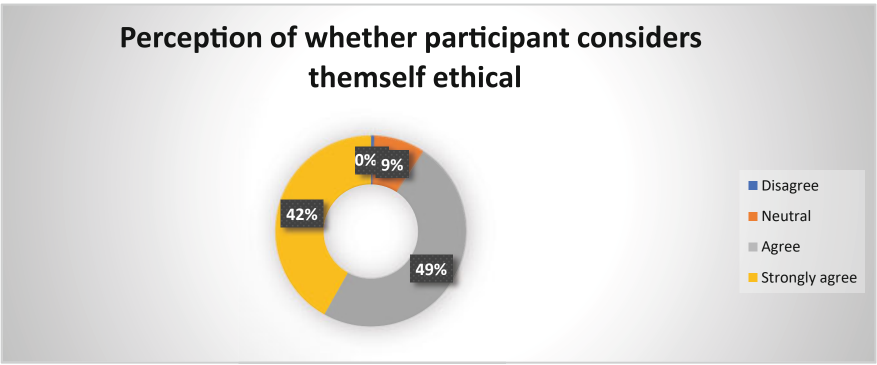

Fig. 1 Perception of own ethics. Source: Author's own compilation

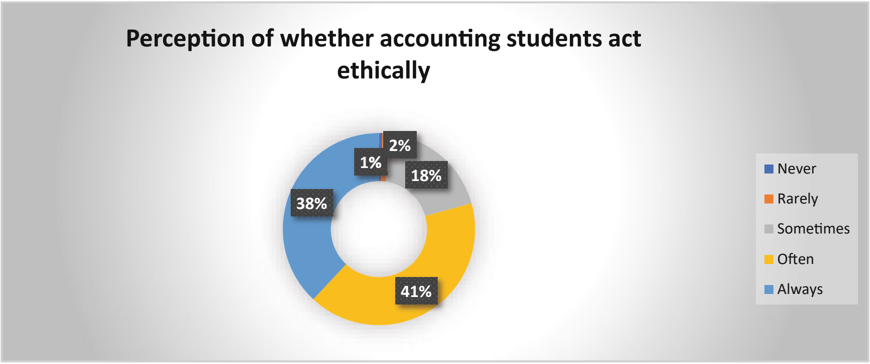

Fig. 2 Perception of ethics of others. Source: Author's own compilation

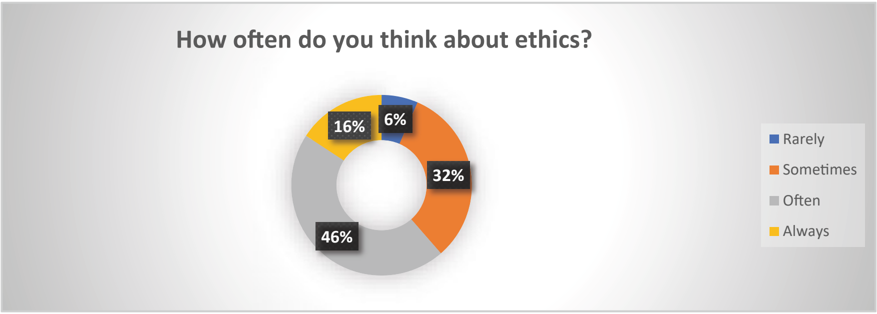

Fig. 3 Interest in ethics. Source: Author's own compilation

enhancement bias. Self-enhancement bias is the tendency to rate oneself more favourably than the rating one assigns to others (Krueger, 1998).

When considering the level of engagement with the topic of ethics, 32% of respondents indicated that they think about ethics sometimes, 46% think about ethics often and 16% indicated that they always think about ethics (Fig. 3). This amounted to 94% of participants indicating that they think about ethics occasionally or more often. The responses therefore indicate a high interest in ethics.

When participants were asked about engagement with ethics in conversation, 37% noted that they talked about ethics sometimes, 29% indicated that they did so often, and 5% expressed that that they always talked about ethics. Therefore, 71% of participants indicated that they engaged with the topic of ethics in conversation on occasion (Fig. 4). The difference in rating between interest (engagement in thought) and engagement in conversation could be attributed to the complexity or controversy of the subject matter or the personality of the individual self. The interest and level of engagement with the subject matter of ethics seems moderately high. This level of engagement is expected to affect the participants' views and attitudes towards ethics, as noted in the literature (Ainley, 2006; Dewey, 1913; Gheorghe, 1998; Hidi, 2006).

Fig. 4 Engagement with ethics in conversation. Source: Author's own compilation

4.2 *Ethics Education: Views and Attitudes and Level of Engagement*

As indicated in the previous section, the views and attitudes (Gheorghe, 1998) and level of enjoyment (Russel & Hollander, 1975) towards ethics education were expected to influence the attitudes of participants towards ethics education. The following questions in the questionnaire sought to gauge this element.

On a 5-point scale ranging from 'Strongly agree' to 'Strongly disagree', rate the following statements:

- Ethics is important as part of the accounting curriculum.
- I am satisfied with the relevance of the topics taught in GAC2AB01.
- Ethical principles and behaviours can be taught.

On a 5-point scale ranging from 'Very enjoyable' to 'Unenjoyable', rate the following question:

- Rate your level of enjoyment when learning about ethics.

On a 5-point scale ranging from 'Very comfortable' to 'Very uncomfortable', rate the following question:

- Rate your level of comfort when you are dealing with ethical dilemmas.

When it comes to the importance of ethics as part of accounting education, no participants indicated that they disagreed with this statement. With 2% being neutral, 12% agreeing and 86% strongly agreeing with the statement, it appears that 98% of participants agree that ethics is an important part of the accounting curriculum (Fig. 5). This is in line with the heightened focus on ethics education.

When participants rated the level of enjoyment of ethics education, 43% rated it as 'enjoyable' and 26% rated it as 'very enjoyable' (Fig. 6). Even though 98% agreed with the importance of the topic of ethics, only 69% found it enjoyable to learn about ethics.

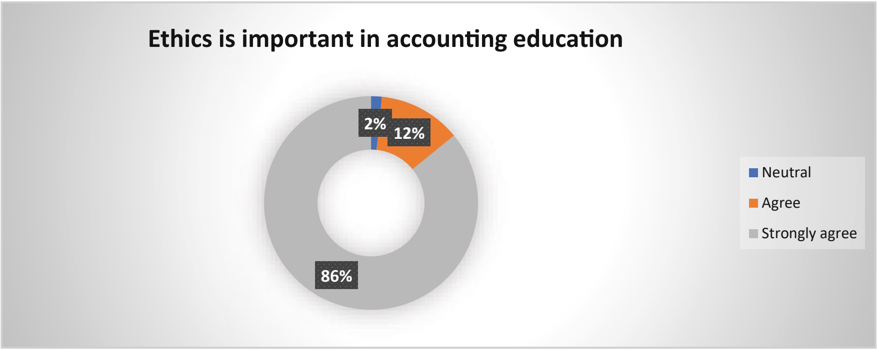

Fig. 5 Perception of the importance of ethics. Source: Author's own compilation

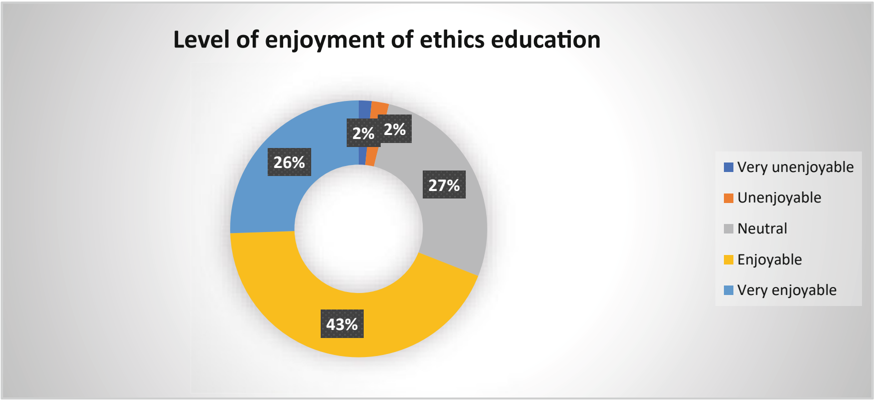

Fig. 6 Level of enjoyment of ethics. Source: Author's own compilation

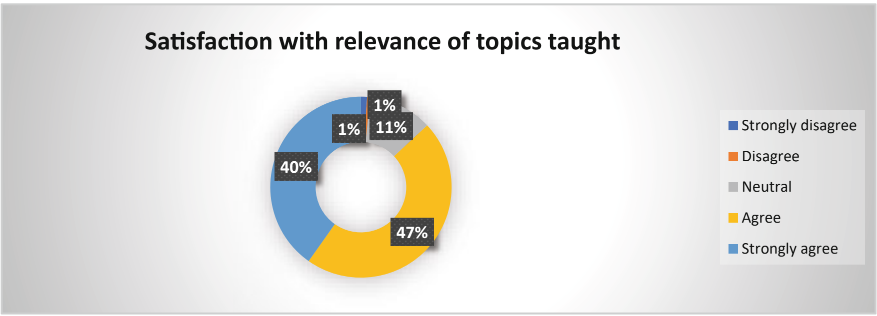

Fig. 7 Satisfaction with relevance of topics. Source: Author's own compilation

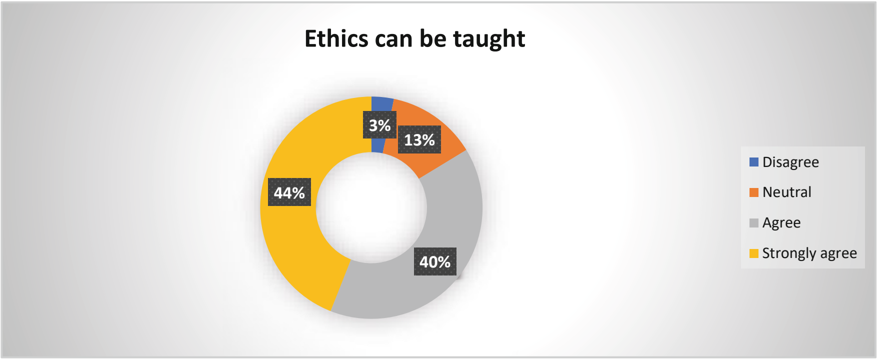

Fig. 8 Perception on whether ethics can be taught. Source: Author's own compilation

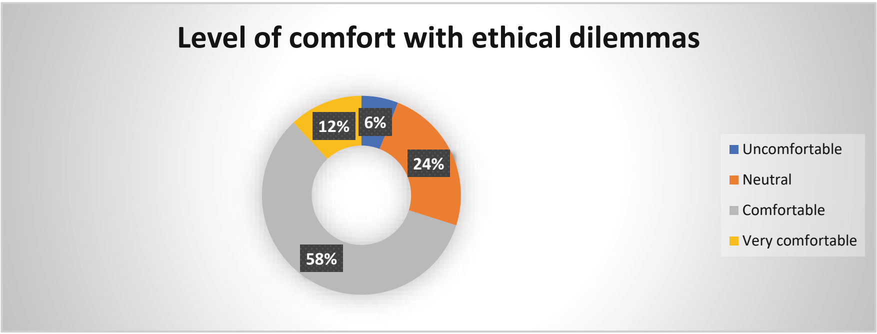

Fig. 9 Level of comfort with ethical dilemmas. Source: Author's own compilation

When it comes to relevance, 87% of participants agreed that they were satisfied with the relevance of ethics topics taught (Fig. 7). This was in line with the high rating of importance.

Of the participants in this study, 84% believe that ethics could be taught, with 40% agreeing and 44% strongly agreeing (Fig. 8). The belief that ethics can be taught indicates a positive attitude towards ethics education. This strong belief in the education of ethics is expected to encourage a positive attitude towards various education methods (Gheorghe, 1998).

Participants indicated a high level of comfort when dealing with ethical dilemmas. While 6% felt uncomfortable and 24% indicated that they were 'neutral', 70% indicated feeling a level of comfort when dealing with ethical dilemmas (Fig. 9). This level of comfort may positively affect their attitude (Russel & Hollander, 1975).

The high incidence of participants viewing ethics in the accounting curriculum as important could be the result of the heightened response of the regulators towards the accounting profession, as noted in Sect. 2.3.1. The changed IESBA code of ethics, the revised SAICA 2025 Competency Framework and the focus on intentional ethics

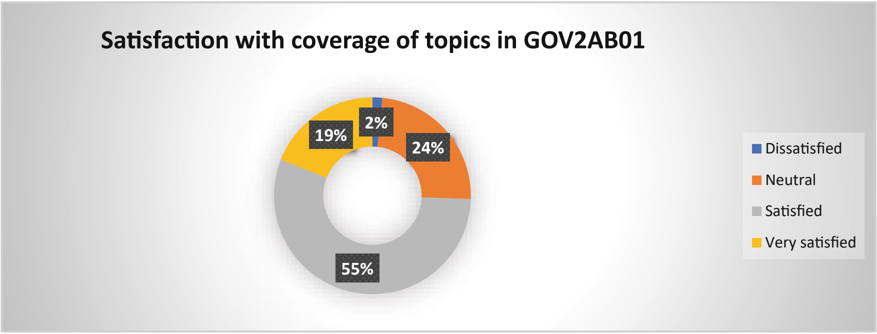

Fig. 10 Satisfaction with content coverage. Source: Author's own compilation

education (Lubbe, 2021) could be the reasons for this heightened awareness and the subsequent high rating of importance. A similar raised awareness by accounting students has also been recently observed among undergraduate accounting students in Nigeria (Okougbo et al., 2021). As per the literature review, the high rating of importance creates the expectation of positive attitudes towards ethics education (Eccles et al., 1983).

Enjoyment and comfort influence attitude (Gheorghe, 1998). The fact that 69% of participants found ethics education enjoyable, 70% experienced a level of comfort in dealing with ethics and 98% rated it as important could be explained by the complexity of the topic of ethics, although many other factors could influence this finding. Past research shows that between enjoyability, usefulness and difficulty, the latter did not appear to be the main driver of avoidance. Difficulty was seen as a low factor of influence, whereas 'enjoyment' and 'usefulness' were considered strong impact factors (Springate et al., 2008). The moderate level of enjoyment may have affected the attitudes of students towards ethics education.

When rating their level of satisfaction with the content coverage in GOV2AB01, only 2% of participants were dissatisfied with the coverage of topics (Fig. 10). Of the respondents, 55% were satisfied and 19% were very satisfied with content coverage. The 24% of participants who indicated that they were neutral in terms of rating their satisfaction with content coverage could be due to an unfamiliarity with ideal content coverage as this was their first experience with an ethics education module.

Therefore, in terms of coverage of topics, 74% of participants were satisfied. When participants considered relevance, 87% of respondents were satisfied (Fig. 5). The positive rating of coverage and relevance indicated a starting point of high satisfaction in the module.

4.3 Benefit of Ethics Education Activities

When asked to what extent the ethics education activity had improved their knowledge of ethics, 99% of students indicated an improvement of 56%, reflecting a significant improvement (Fig. 11). As noted in the literature, a high perception of value or importance has a significant influence on attitude towards learning and motivation. Therefore, this points to a very positive attitude towards ethics education (Eccles et al., 1983).

4.4 Summary of Findings

The participants displayed a high level of satisfaction with their second-year ethics education module. This deduction is based on the high perception of knowledge gained through ethics education activities. The vast majority (99%) of participants indicated an improvement in knowledge, with 55% representing a significant improvement. The high levels of satisfaction with ethics education activities could have been influenced by individual's attitude towards the subject of ethics. A higher level of engagement or motivation may influence their level of satisfaction. With 91% of participants agreeing that it was important to be ethical (Fig. 5), this could well be the case. While the participants agreed that ethics were very important, their level of engagement with ethics was lower: 78% of participants indicated that they thought about ethics on occasion but 42% indicated that they rarely discussed the topic of ethics with friends or family (Figs. 3 and 4). The highly rated level of importance of ethics may have influenced the satisfaction rating, but the lower engagement levels increased satisfaction with the nature of ethics education activities.

Fig. 11 Extent to which knowledge of ethics was improved by ethics education activities. Source: Author's own compilation

A higher level of engagement or motivation about their perceptions of ethics may have influenced the participants' level of satisfaction. With 91% of participants agreeing that it was important to be ethical (Fig. 5), this could well be the case. The participants' level of engagement with ethics was lower, with 78% indicating that they thought about ethics on occasion and up to 42% indicating that they rarely discussed the topic of ethics with friends or family (Figs. 3 and 4).

Based on the study data, it can be concluded that the attitude towards ethics and ethics education is positive. As expected from the literature review, this positive attitude appeared to be attributable to the high sense of importance and relevance of the topic of ethics (Gheorghe, 1998) and the high perception of value added or knowledge gained from the Ethical Ambassador (Eccles et al., 1983). This is in line with the findings of Marriot (2004) on attitudes based on improved knowledge, and Taplin et al. (2017) on the positive experiences of students with ethics education.

In line with the research objectives, the findings indicate that the attitude of accounting students towards ethics and ethics education was positive. This positive attitude could be an opportunity for exposure to more complex content and newer educational initiatives, such as online ethics.

5 Limitations and Recommendations

5.1 Limitations

The generalisability of this study is limited due to the sampling method. Normally, the generalisability of a survey strategy is one of its greatest strengths (Mouton, 2009). However, the purposive sampling strategy used in this study places a limitation on the conclusions that can be drawn from the population (Quinlan et al., 2018). Moreover, the findings are based on a homogeneous sample (19- to 20-year-old undergraduate students) that is relatively small ($n = 185$ for the pre-questionnaire and $n = 282$ for the post-questionnaire). This may have affected the results and influenced the generalisability of the findings. Lastly, the study was conducted at only one SAICA-accredited HEI; therefore, the findings are limited to the attitudes of the students at that institution only.

Another limitation lies in the inherent nature of an attitudinal study. Attitudes, as opposed to knowledge or behaviour, are abstract and could influence reliability and validity. Furthermore, attitudes were surveyed after the participants' first encounters with ethics education. Self-report bias is evident when researchers ask people to explain their ideas, feelings or behaviours, rather than measuring them directly and objectively (American Psychology Association [APA], 2022). This could possibly lead to methodological issues as participants may not give responses that are entirely accurate out of ignorance or out of a desire to appear intelligent (APA, 2022). Even though the response rates were acceptable for this study, Estelami (2015) points out that participants with a very negative attitude or perception usually do not even complete the questionnaires. Data on the most negative attitudes towards the subject matter may therefore be missing, and consequently, the results should be interpreted with caution (Estelami, 2015).

6 Recommendations

The following recommendations are made based on the study findings:

- Accounting professional bodies should maintain the spotlight on ethics because this heightens awareness of ethics.
- Adequate and ongoing cooperation should be encouraged between audit firms, professional organisations and universities towards the strengthening of ethics education through relevance.
- The high level of comfort and satisfaction with ethics may indicate capacity for innovation in ethics education.

7 Conclusion

An effective response is needed to unethical behaviours within the accounting network. As part of this response, the present study sought to empirically gauge the attitudes of accounting students towards ethics and ethics education. The study results revealed that participants have a positive attitude towards ethics and ethics education. A large contributor to this positive attitude was the perceived high sense of importance and relevance of ethics. Any identified challenges were overshadowed by the sense of being relevant and stimulating and of value. Furthermore, the study findings confirmed that the ethics education curriculum is important, which could indicate capacity for innovation, with the ultimate goal of more effective ethics education and genuine individual accountability.

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A Literature Review of the Level of Financial Literacy in South Africa

Oji Okpusa Oke and Olumide Henrie Benedict

Abstract The importance of financial literacy, which includes facilitating a comprehensive understanding of how money works and guiding how an individual makes economic decisions, has received considerable attention from scholars. Several studies have disclosed that the less educated and low-income earners display low levels of financial literacy in South Africa. However, despite the numerous studies, none has been able to capture financial literacy through an applicable theoretical lens that situated the issue in a manner that provides a direction on dealing with the findings. To this effect, the paper aimed to: undertake a literature review and analysis that suggest a theoretical framework (vulnerable group theory and the public service theory) that the key findings may be situated to foster better understanding of the problem. The methodology hinges on a critical educational research paradigm. The critical theory assumes that existing reality is shaped by "cultural, political, ethnic, gender and religious factors that interact to create the social system". The paradigm does not just try to disclose or comprehend societal phenomena but to change the status quo. Thus, this research is not focused on merely highlighting the level of financial literacy in South Africa, but to suggest actions that minimise the ills to transform the situation. The study started with a systematic review of empirical studies on financial literacy with an emphasis on those relating to South Africa. Existing literature on the problem are miniature but very consistent. The literature review presents three classes of cohorts of South African society that still record low levels of financial literacy: the less educated, the low-income earners and the black people who form the bulk of low-income earners. Financial literacy comes with a cost which these classes of citizens may not afford. The lack of exposure to financial literacy may not be properly understood outside the context of some socio-economic profiling of the people, and there may be a need for it to be treated as a public service that ought to be readily available in all equality and equity. This approach may contribute to lifting the vulnerable group of society from perennial financial illiteracy and as a result informs them to make favourable

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economic decisions. To this effect, there is a need to capture results and findings from existing literature in a theoretical framework to lend itself to easy comprehension of the problem and the implementation of possible feasible interventions.

Keywords Critical theory · Financial literacy · Systematic literature review · Vulnerable group · Public service

1 Introduction

Financial literacy is described as the skill and the capacity to comprehend how money works and how an individual makes money through making informed and effective decisions with all the financial resources (Belas et al., 2016, p. 193; Gold, 2018, p. 1). Financial literacy is "the ability to use knowledge and skills to manage one's financial resources effectively for a lifetime of financial security" (Siwale et al., 2021, p. 125). Managing financial resources entails, but is not limited to, managing credit cards, preparing a budget, buying insurance, and even making investment decisions (Matemane, 2018, p. 5). Felipe et al. (2017, p. 847) disclose that the importance of financial literacy has been globally recognised resulting in the study by financial institutions, academics, and governments regarding the state of financial literacy in the respective countries and the effects on individual financial well-being.

Global studies as well as South African ones on financial literacy display findings which are spread along demographic structure (Deb, 2020, p. 61; Fatoki & Oni, 2014, p. 413; Lusardi, 2019, p. 4). In South Africa, researchers have consistently reported that the low-income earners and the less educated score low in financial literacy (Roberts et al., 2018, p. 5, Source B, Source C). The black community, when compared to other races, make up most of the low-income earners (Roberts et al., 2018, p. 5), and hence are more likely to rank low in financial literacy. South Africa is regarded as among the most unequal society in the world, mainly because of the past apartheid system which marginalised the majority (mainly Blacks) from participating in several economic activities that could elevate them from the poverty line, and exposure of financial literacy skills (Matemane, 2018, p. 3; Francis & Webster, 2019, p. 733).

Moreover, the government consistently implements policies that could lift more people out of poverty through the creation of jobs and engagement in economic activities. These initiatives may not suffice without capacitation at individual levels. Financial literacy is taunted as the skill that assists individuals in making informed decisions that could contribute to lifting them out of poverty. Consequently, a series of studies have suggested several models to adopt in the implementation of financial literacy skills programmes so that more people can benefit from it (Antoni & Notshe, 2020, p. 563; Oseifuah & Gyekye, 2014, p. 242). The purpose of this review was to identify themes and key findings of the various studies relating to financial literacy in South Africa. The review intends to contribute to the development of financial literacy in South Africa by suggesting a theoretical framework that provides the lens through which financial literacy challenges could be viewed and addressed for more effective results; a gap found to have been scarcely addressed by researchers. This is due to the relationship between financial literacy and the economic well-being of the individual and by extension, a better economic atmosphere for the nation (Ngek, 2016, p. 360; Ozili, 2020, p. 12). The rest of the paper is organised as follows: Sect. 2 contains the methodology applied while the theoretical framework and literature review are presented in Sect. 3. Furthermore, Sect. 4 contains the discussion and followed by Sect. 5 which contains the conclusion. The review revealed a gap in the literature which pertains to absence of a theoretical framework that guides the perception of financial literacy towards determining an effective approach to tackling the problem in South Africa. This significantly provided a perception upon which relevant deductions have been drawn towards suggesting a theoretical framework for addressing the gap found in the literature.

2 Methodology

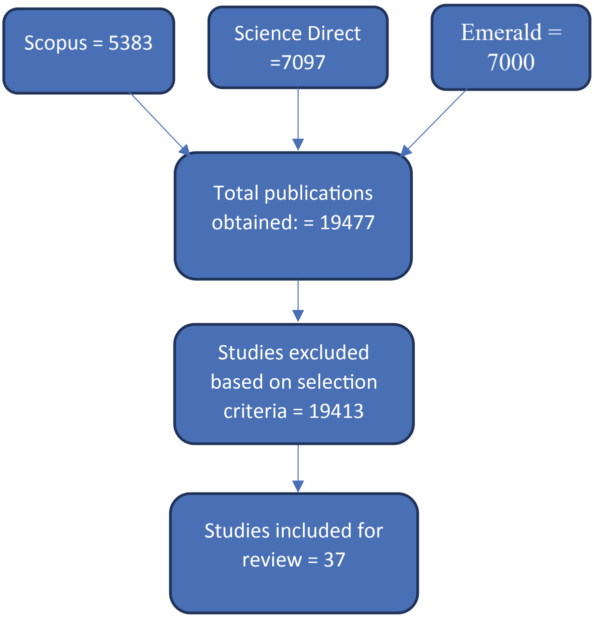
An extensive literature review was conducted to examine the level of financial literacy of South Africa and the extent to which steps taken to address the challenge have worked in achieving the expected outcome. Extant literature were obtained using various sources such as Scopus, Science Direct and Emerald platform. Several keywords such as financial literacy of South Africa, financial inclusion in South Africa and financial education in South Africa, were used in the literature search and without time specification. Figure 1 depicts the sources, number of articles obtained, and the samples selected:

Selected studies were articles published in journals that related to South Africa only. This is to ensure that only peer-reviewed studies that focused on South Africa were used. Based on these criteria only 37 peer-reviewed articles published between 2008 and early part of 2023 were selected.

3 Theoretical Foundation

This review hinges on the critical educational research paradigm. The critical theory assumes that existing reality is shaped by “cultural, political, ethnic, gender and religious factors that interact to create the social system”. The paradigm does not just try to disclose or comprehend societal phenomena but to change the status quo. Thus, this research is not focused on merely highlighting the level of financial literacy in South Africa, but to suggest actions that can minimise the ills to transform the situation positively based on an effective theoretical framework. Auguste Comte (1798–1857) stated that “theories are the conceptual lenses through which we can sort out the plethora of facts that we confront daily” and that “without theories, we might not be able to identify something as a fact at all”. Studies which have identified

Fig. 1 Sources and articles for the study



financial literacy as a problem facing countries of the world and South Africa accept the view that this problem is a fact. However, there is a lack of a fully formed and appropriate theory to explain why the problem persists and how the problem can be effectively tackled. This study sought to address this problem by developing a theoretical exposition that would direct how financial literacy issues can be effectively addressed in South Africa for improved outcomes. Thus, this review mimics the work of Coase (1937, p. 390) who found that the study of corporate firms did not have any theory to explain their existence and hence the development of the Culture Theory for explaining why corporate companies exist. Consequently, this study formulated a theoretical framework which serves as a guide in tackling the challenges of financial literacy in South Africa just as Coase (1937, p. 390) developed the culture theory which helps to explain the existence of corporate organisations.

4 Literature Review

Making sense of the current and the likely future financial literacy situation of South Africa starts with understanding the past status because of the link between the future, the present and the past. Furthermore, articulating the findings of previous authors assists in establishing "a strong base, on which further knowledge of a particular topic can be developed" (Anshika & Singla, 2022, p. 1357). In addition, the literature review helps to point out the gaps in available studies as well as provide reason for a study that will serve in advancing a theoretical framework.

Consequently, an extensive review of studies related to the financial literacy of South Africa and to what extent the measures taken to address the challenges are effective, have been carried out. The review showed that the subject of financial literacy has attracted several research activities in South Africa and most of which centred on financial education, individuals' financial literacy level, students and youth financial literacy, small and medium enterprises, stock market participation, financial inclusion as well as retirement planning. These themes were identified by reading the titles, abstracts, and conclusions of the respective articles (See Table 1). Moreover, the review showed the efforts of the government of South Africa together with some institutions towards improving the financial literacy level of the citizens.

5 Financial Literacy, Poverty, and Youth Unemployment

The Council on Higher Education (CHE) stated that about 80% of those who completed grade 12 do not attend university or any other post-secondary institution (CHE, 2017, p. 2). The Council also highlighted that more than three million of those who attained the matric education as at 2017 are classified as "not in employment, education or training (NEET)" (CHE, 2017, p. 5). The NEET population are those who are neither studying, undergoing training nor are gainfully employed. The situation highlighted seems not to have improved 7 years after. In the first quarter of 2023, there were about 10,2 million young people aged 15–24 years, of which 36,1% were not in employment, education or training and in both quarters 1 of 2022 and 2023, more than four in ten young males and females were not in employment, education or training (Stats SA, 2023). This situation calls for a means to give the youth and the less educated the financial skills that can guide them in decision-making that might make life better for them. Otherwise, they will become the less educated and the low-income earners that may continue to score low in financial literacy with the attendant problems it poses to the country at large.

Financial literacy skills for low-income earners and the less educated can be modelled in a manner that is peculiar to the cohort, as the majority of them may not study beyond the matric level. This view has been upheld by Bongini et al. (2018, p. 22) who suggested the application of an alternative and sophisticated model of financial literacy that targets specific population groups rather than grouping everybody as if everyone has the same financial literacy needs. The suggestions of Bongini et al. (2018, p. 22) motivate the idea to build a peculiar financial literacy model for low-income earners and the less educated by adopting a public policy that is grounded on a relevant theoretical background. The aim is to enhance the financial literacy skills of the cohort by exposing them not only to personal financial management and the financial market but also the skill to make better decisions that can help them come out from the poverty line and to live better lives as individuals.

Table 1 contains the selected samples, author(s), year of publication, theme, and key findings.

Table 1 Authors and their key findings

	Year	Author(s)	Theme	Key findings
1	2008	Kotzè & Smit	Students' FLL	Students' low fin lit level
2	2009	De Clercq & Venter	FL of primary school learners	The age of learners impacts their FLL
3	2009	De Clercq & Venter	FLL	Gender, age, language, race and income levels impact the FLL
4	2010	Maistry	Financial education	Need for the right education that enhances FL
5	2010	Oseifuah	FL & Youth entrepreneurship	FL contributes to youth entrepreneurial skills
6	2012	Shambare & Rugimbana	FLL among the educated	The need to reinforce FL of persons
7	2013	Louw et al.	Students' FL	Students' FL is not sufficient
8	2014	Fatoki & Oni	FL of individuals	Researchers used different measuring instruments leading to different conclusions
9	2016	Ngek	FLL of SME operators	Low level of FL
10	2014	Oseifuah & Gyekye	Students' FLL	Students' low Fin Lit level
11	2016	Massey et al.	Financial education	Need for the right FL project evaluation tools
12	2016	Wentzel	FL education	Ineffective FL education programmes
13	2017	Fomum & Jesse	FI & asset acquisition	FI associated with asset acquisition
14	2017	Louis & Chartier	FI	Vulnerable and the poor in South Africa are excluded from the formal economy.
15	2017	Ramavhea et al.	Undergraduate FLL	Need for FL of students
16	2017	Sibanda & Sibanda	Financial education	The need for sustainable FE
17	2018	Matemane	FLL of the Black	Blacks are less in FLL
18	2018	Mudzingiri et al.	Students' FB	low FL associated with PFD
19	2018	Moloi & Madikizela	Students' FLL	low level of SA FL
20	2018	Roberts et al.	FL in SA	Low FLL of young people, the uneducated and the poor
21	2019	Nanziri & Olckers	FLL & demography	Less educated, low income display low levels of FL. FL influences pension, mutual funds, and stock ownership.
22	2019	Willows, G. D.	Financial knowledge of university employees	All demographic subgroups had low levels of financial knowledge;
23	2019	Zerihun et al.	FLL	The link between FL & FM
24	2020	Antoni et al.	Students' FLL	No significant FLL
25	2020	Rossouw & Greef	FE of teachers	Need for sustained FE

(continued)

Table 1 (continued)

	Year	Author(s)	Theme	Key findings
26	2020	Zeka, B.	Retirement funding	A positive link between FL and retirement funding
27	2021	Chipunza & Fanta	Financial inclusion	Gender, education, FL, income, location and geographical proximity determine the quality financial inclusion
28	2023	Mahalika et al.	FI and poverty	Lowly educated, rural dwellers are financially excluded
29	2021	Ojo. T. A.	Women and FI	Little institutional quality and governance on financial inclusion for women
30	2021	Roberts et al.	FL in SA	Data for the last decade provides strong evidence for the existence of low levels of financial literacy in South Africa
31	2022	Dhlembeu et al.	Retirement planning & FL	FL influences retirement planning
32	2022	Simatele & Maciko	FI of rural dwellers	Eligibility, affordability, and proximity affect FI
33	2022	Munyuki & Jonah	FL & entrepreneurship	Positive association between FL and entrepreneurial success
34	2022	Nyakurukwa & Seetharam	Stock market participation & FL	FLL motivates stock market participation
35	2022	Fielies & Mbukanma	FL & materialism	FL is essential for making good financial decisions
36	2023	Akande et al.	FL & Financial inclusion	FL influences FI
37	2023	Ndou, A.	FL & demographic factors	Demographic factors have a negative relationship with FL

Note: FL = Financial literacy. PFD=Poor financial decision. FLL = Financial literacy level. FB=Financial behaviour. FE = Financial education. SA = South Africa. FI-Financial Inclusion. FM = Financial management

6 Individuals

Struwig et al. (2013, p. 111) interviewed a sample of 2518 people out of a study population of about 14 million South African households which achieved a national representative sample and ensured that individuals from 16 years and above, were represented. The study sample comprised households as well as hostel dwellers covering ethnic and cultural segments of South Africa. The result showed that a large proportion of South Africans do not have sufficient knowledge of financial literacy meaning that a considerable part of the population may not possess the skills for making effective financial decisions. The study further found that the well-educated, the rich, the employed and urban dwellers scored the highest points in financial literacy (Struwig et al., 2013, p. 111). Nanziri and Leibbrandt (2018, p. 10) used questions that aligned to the two financial literacy domains of financial knowledge and financial capability to obtain responses which were computed and the average scores cross-tabulated with the demographic characteristics of the population. Furthermore, regression analysis was used to investigate the determinants of financial literacy. The results presented revealed a national average financial literacy score of 48.4. The results also indicated that women, young adults (including students), individuals with less than matric (high school) education, black people, the unemployed, and rural dwellers scored below average financial literacy level marks while urban dwellers exhibit above average financial literacy. The authors also found that education, income, geographical location, marital status, and race significantly contributed to the financial literacy of South Africans. Moreover, Nanziri and Olckers (2019, p. 10) analysed measures of financial literacy included in the National Income Dynamics Study (NIDS) survey. The study found the less educated and low-income earners displayed low levels of financial literacy. Other studies which focused on individual financial literacy levels in South Africa and who found similar results include Fielies and Mbukanma (2022, p. 177), Ndou (2023, p. 161), willows (2019, p. 21), Zerihun and Makgoo (2019, p. 59). Furthermore, Mahalika et al. (2023, p. 109) found that lowly educated Africans residing in the rural areas of Eastern Cape, Free State and Limpopo provinces were associated with a greater likelihood of being financially excluded due to their demographic backgrounds which results into suffering "greater money-metric poverty likelihood".

7 Students

Shambare and Rugimbana (2012, p. 1) investigated financial illiteracy among university students using a self-administered financial literacy scale on a sample of 214 students from a large South African metropolitan university. Results obtained indicated moderate levels of financial illiteracy which revealed a need to reinforce basic financial concepts even on students. Louw et al. (2013, p. 447) evaluated the financial literacy needs of third-year students at a South African university using survey methods and questionnaires to first evaluate the socio-economic environment and exposure to the world of finance and thereafter the financial literacy of 424 students who participated in this study. Results indicated that students need more training in financial literacy. Oseifuah and Gyekye (2014, p. 242) used a structured questionnaire to collect data which were analysed using logistic regression and Chi-Square statistical procedures on the Statistical Package for Social Scientists (SPSS) software. The study examined the relationship between financial literacy and demographic and other socioeconomic factors of a sample of undergraduate students as well as evaluating how the financial knowledge of undergraduate students correlates with their attitude and behaviour towards personal finance issues. Results obtained showed that accounting students at the University of Venda are not as financially literate as expected. The authors, therefore, suggested a review of the academic curriculum in the Bachelor of Commerce programme to include money management course.

Other studies on student financial literacy in South Africa and with similar outcomes include Mudzingiri et al. (2018, p. 2), Moloi and Madikizela (2018, p. 65). Antoni and Notshe (2020, p. 563) investigated differences in financial literacy levels of non-Commerce undergraduate and Commerce students in a South Africa university. The research employed a quantitative methodology with a closed-ended questionnaire for data collection on the financial knowledge and financial skills of students together with a T-test of independence and Cohen's d used to determine whether a significant difference existed between the two groups of students. Results obtained showed that Commerce students had higher levels of financial literacy than non-Commerce students. The authors, therefore, suggested that financial literacy programmes be implemented for both groups of students focusing on improving the financial literacy levels of both groups.

8 Stock Market Participation

Nanziri and Olckers (2019, p. 10) who asserted that financial literacy relates to individual's economic well-being also asserted that it increases the possibility of a person having a pension or mutual funds, stocks, or shares. This is because financial literacy was found to be positively associated with ownership of a pension and of mutual funds, stocks, or shares. Nyakurukwa and Seetharam (2022, p. 1) applied a probit regression model to test the association between basic financial literacy and stock market participation. The results obtained showed that the basic financial literacy variable is positive and significantly associated with stock market participation. Furthermore, Nyakurukwa and Seetharam (2022, p. 1) found an association between financial literacy and stock market participation, education, race, and age. If financial literacy is associated with stock market participation, it, therefore, suggests that the low level of financial literacy among the South African population prevents them from participating in the Stock market.

9 Retirement Planning

Matemane (2018, p. 14) found that persons with lower levels of financial literacy are more likely not to have savings. The author revealed further that level of income, gender, area of study, place of origin, population group, age, parents' academic qualifications and marital status do determine a person's propensity to save. The study examined the financial literacy of black South Africans with a commerce tertiary qualification working in Pretoria and Johannesburg, based on descriptive research and structured questionnaires on 171 participants who work in different sectors of the economy and live in Gauteng. Dhlembeu et al. (2022, p. 13) examined the impact of financial literacy on retirement planning of South Africans using secondary data from the 2011 South African Social Attitudes Survey (SASAS).

Data were analysed using descriptive statistics together with binomial logistic regression. The result obtained indicated that financial literacy has a significant impact on retirement planning.

10 Small and Medium Enterprises

Oseifuah (2010, p. 164) used both desk research and questionnaire alongside interviews to assess the level of financial literacy among youth entrepreneurs in the Vhembe District of the Limpopo Province, South Africa. Results showed that financial literacy among youth entrepreneurs in the Vhembe District was above average which contributed significantly to their entrepreneurship. Results of a study by Ngek (2016, p. 354) showed that financial literacy positively impacted the performance of SMEs. Thus, the result showed the necessity for the acquisition of financial literacy skills by SME operators as a necessary aspect of entrepreneurial activities. Data collection for the study was by self-administered questionnaires on SME owners operating in the Mangaung metropolitan municipality using Convenience sampling in conjunction with snowball sampling method. The result disclosed a minimal knowledge of financial literacy among the SME operators. Furthermore, Munyuki and Jonah (2022, p. 137) found a positive association between financial literacy and entrepreneurial success. Thus, there is a need to increase the levels of financial literacy among South Africans to increased business success.

11 Financial Inclusion

Financial inclusion, which entails providing individuals and businesses with access to beneficial and economical financial products and services appropriate to their needs such as making payments, savings, credit, investment, and insurance, all supplied reasonably and reliably is a crucial social and economic policy objective particularly for developing countries such as South Africa (Louis & Chartier, 2017, p. 174). Thus, financial inclusion of vulnerable communities in South Africa would include widening access to financial services which goes a long way in reducing poverty and inequality as well as creating jobs. Ojo (2021, p. 59) found that there is a minimal "institutional quality and governance" that encourages financial inclusion of women in South Africa. Other studies on financial inclusion in South Africa include Simatele and Maciko (2022, p. 12) as well as Mahalika et al. (2023, p. 127) who found that those financially excluded are "predominantly lowly educated female Africans residing in rural areas who are unemployed or inactive in the labour market. Moreover, the study of Akande et al. (2023, p. 1) revealed that financial literacy positively and significantly influences financial inclusion. The study's implication thus, "informs structured intervention for improving financial literacy to assist the target group with access to requisite funding, which could support their economic activities for a decent living" (Akande et al., 2023, p. 1).

12 Discussion, Conclusion, and Recommendation

Studies on financial literacy in South Africa published between 2008 and the early part of 2023 have been reviewed. The review showed little improvement in studies carried out on the subject over the past decade in the country. This is because Fatoki and Oni (2014, p. 409) found only 15 papers comprising published articles, student dissertations and theses for the period 2006 to 2014. In this present study, the internet search together with Scopus, Science Direct and Emerald yielded 37 journal articles. This showed that much study has not been carried out in the field of financial literacy in South Africa as observed by Matemane (2018, p. 1). It is possible that information saturation may be responsible for the lack of interest in the study area as results over the years remain consistent. This may be an indication that the underlying problems around the financial literacy of the low-income earners remain unsolved. Furthermore, the review revealed that results of financial literacy studies in South Africa have consistently been produced along demographic factors which include individuals, students, financial education, small and medium scale enterprises, stock market participation and planning for retirement. The overall results consistently revealed that educational level, age, employment status, race, settlement, and income significantly influence financial literacy in South Africa.

The literature reviewed exposed that young adults, low-income earners, the rural dwellers, the black community, and the unemployed show low levels of financial literacy in South Africa. Notwithstanding, several suggestions and efforts have been put in place in elevating financial literacy level in the country, however, a lot is left to be achieved as studies keep indicating low levels of financial literacy among some vulnerable groups such as rural dwellers, young people, the unemployed and so on.

Moreover, the purpose of this was to identify the financial literacy situation in South Africa and therefore suggest a theoretical framework that may guide relevant authorities in making decisions and taking actions towards addressing the problem effectively. This study, therefore, recommends that government at all levels should perceive financial literacy in South Africa as a public service which needs to be delivered to citizens at all costs. In addition, the affected categories of South Africans should be regarded as the vulnerable group whose needs the government has to meet. This is in recognition of the four dimensions of financial literacy consisting of financial control, financial planning, financial knowledge and product choice which if acquired through financial literacy, will enhance the financial well-being of individuals and which ultimately lead to a favourable economic condition of the country.

The study shows that there is a relationship between government, financial literacy and the expected outcome of the interactions. Government can provide public goods to citizens in the form of education including financial literacy through a well-designed educational system, implementing the dimensions of financial literacy through strict adherence to the tenets of the financial literacy theories, can produce a financially literate society towards achieving the country's economic well-being.

13 Limitation

This study reviewed only 37 articles on financial literacy relating to South Africa accessed through the internet search, EBSCOhost and Google Scholar. Many more papers may be available that our search could not access. Consequently, the result of this paper is limited to the data obtained from the 37 articles on South African financial literacy reviewed. Further studies should involve exploring more data sources for more articles not covered in this study. In addition, Multi-theoretical structure: a more theory-building study may illuminate the problem in a clearer manner that is easily understood. To this effect, theories on vulnerable group, public service, and the dimensions of financial literacy may be helpful.

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Effects of Artificial Intelligence on Money Laundering in Southern Africa

Mufaro Dzingirai

Abstract It is interesting to observe that artificial intelligence is gaining popularity in both developing and developed countries as it attracted the interest of accounting, business, and management professionals. This necessitates the need to scrutinise the interaction between artificial intelligence and money laundering. There is an ongoing debate concerning the justifications of artificial intelligence in dealing with money laundering. In this regard, the Southern Africa region is no exception to money laundering just like any other region. As such, the application of artificial intelligence appears to be a rational strategy to curb financial leakages in the finance sector. Although there is an increase in the adoption of artificial intelligence, scanty is known concerning the association between the application of artificial intelligence and money laundering, especially in the Southern Africa region. In this respect, this research aims to provide the effects of artificial intelligence on money laundering in the Southern African region. The study adopted the structured literature review methodology and then six positive effects were observed. These are detecting money laundering activities, enhancing legal compliance, augmenting customer behavioural analytics, detecting money laundering networks, robust financial crime risk computation, and informing evidence-based policy formulation. However, the negative effects are in the form of infringing customer privacy rights, and poor data governance. Despite the existence of few negative effects, it is concluded that artificial intelligence helps to combat money laundering in the Southern African region. As such, it is suggested that financial institutions should up-skill their personnel and up-scale their business intelligence projects.

Keywords Artificial intelligence · Money laundering · Big data · Data analytics · Blockchain · Digital transformation

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1 Introduction

Recently, the cases of money laundering are increasing exponentially, and other crimes related to finance are growing worldwide. It is an open secret that the techniques and tools used by financial criminals to evade their detection are considered to be more sophisticated than before (Alexandre & Balsa, 2023; Meiryani et al., 2023; Singh & Lin, 2021). As such, many financial and government institutions are heavily investing in advanced technology so as to deal with financial crimes effectively and efficiently like money laundering. This implies that governments and banks are at the forefront when it comes to curbing money laundering programmes. In this regard, advancement in machine learning is widely accepted as a powerful tool to institutionalise anti-money laundering programmes (Pavlidis, 2023). This heightens the need for artificial intelligence adoption by financial institutions across the world.

Globally, the adoption of machine learning as a form of artificial intelligence helps governments and financial institutions to monitor financial transactions in an effort to detect suspicious transactions. A combination of advanced algorithms and machine learning helps financial institutions to effectively monitor money laundering transactions in real-time (Stears & Deeks, 2023; Xia et al., 2022). Traditionally, financial institutions used expert judgment, elementary statistical indicators, and red flags as techniques to detect suspicious financial transactions. Nonetheless, these tools are longer efficient and effective in the twenty-first century as they cannot capture advanced trends in money-laundering behaviours. With this in mind, it appears that machine learning helps banks to build a more granular and sophisticated algorithm to detect money laundering activities (Weber et al., 2023). Nevertheless, it requires massive investment in advanced technologies in the financial sector.

Going forward, combating money laundering is the greatest challenge of the twenty-first century when it comes to the financial sector. Most financial institutions employ manual and repetitive tasks that cannot efficiently and effectively combat advanced money laundering activities. Given the high volume and velocity of financial data, artificial intelligence capabilities are the need of the hour in trying to reduce money laundering activities across the globe (Couchoro et al., 2021; Meiryani et al., 2023). In spite of the essence of artificial intelligence, it is of paramount importance to assess how artificial intelligence applications can reduce money laundering. Moreover, there is an ongoing debate related to how artificial intelligence can replace human synthesis and human decision-making processes (Alexandre & Balsa, 2023; Xia et al., 2022). In this regard, one may argue that a hybrid approach towards money laundering appears to be a better option. A hybrid approach to combating money laundering involves the use of both artificial intelligence applications, and human processes and insights. This suggests that the deployment of artificial intelligence programmes or humans in isolation cannot drive the best outcomes when it comes to combating money laundering.

In light of the above, money laundering activities range from 2% to 5% of the global Gross Domestic Product (GDP) (Craig, 2019). In trying to arrest money laundering activities, it must be noted that the adoption of artificial intelligence applications comes with costs. In this sense, artificial intelligence programmes require large sums of money in terms of sourcing applications and training human resources. However, artificial intelligence adoption can drive operational efficiency in fighting against money laundering (Searle et al., 2022). This implies that costs related to customer screening, transaction monitoring, and customer due diligence can be significantly reduced by adopting artificial intelligence in the financial service.

In the context of Africa, many African countries experienced a great challenge of money laundering in the past three decades as they mainly rely on cash transactions and weak legal institutions (Couchoro et al., 2021). Moreover, it is a mammoth task for the African governments owing to the deregulation of the financial sectors (Latif, 2022). It is within this that Issah et al. (2022) argued that African countries lose US $50 billion per year related to money laundering. In trying to curb money laundering, South Africa adopted the first money laundering legislation in 1992 to deal with proceeds from the Drugs and Drug Trafficking Act 140 of 1992. In 2001, it adopted the Financial Intelligence Centre (Chitimira & Warikandwa, 2023). It is well-documented that before 1998 South African financial institutions were poorly regulated when it comes to money laundering activities (Chitimira, 2021). More interestingly, the non-profit sector of South Africa is exposed to economic crimes like terrorist financing and money laundering (Bissett et al., 2023).

The government of Zimbabwe appears to be struggling to adhere to international measures to deal with money laundering and terrorism financing. In early 2020, Pretoria Portland Cement Limited, Old Mutual, and Seed Co. International were investigated for activities related to money laundering in fungible stocks (Chitimira & Ncube, 2021). Despite the availability of various money laundering cases, much less is known about money laundering in Southern and Eastern Africa (Basel Institute on Governance, 2020; Goredema, 2004; Issah et al., 2022). More worryingly, an interaction between artificial intelligence and money laundering is under-researched in Southern Africa. Against these knowledge gaps, the main objective of this study is to establish the effects of artificial intelligence on money laundering in Southern Africa.

The remained parts of this paper are structured as follows: the second section covers the conceptualisation of money laundering and artificial intelligence. The third section covers the structured literature review methodology whereby the search strategy and the process of doing a structured review are reported. In the fourth section, issues related to the results of the current study are reported. Notably, a discussion of the results is also provided. The fifth section covers the implications of the study. Lastly, issues surrounding the areas for further research are presented in detail.

1.1 Conceptualisation of Money Laundering

It is a fact that there is no standard definition of money laundering in the current literature. This situation has been brought about by the existence of various scholars who defined money laundering from different perspectives. In this regard, some authors defined money laundering from financial, economic, and legal perspectives. Generally, money laundering is defined as cunning efforts to disguise the origin of crime proceeds (Zondo, 2022). Notably, the legal perspective of conceptualising money laundering dominates other perspectives such as financial and economic perspectives. From a legal perspective, money laundering refers to "transferring illegally obtained money through legitimate people or accounts so that its original source cannot be traced" (Han et al., 2020, p. 212).

1.2 Anti-Money Laundering Policies

Anti-money laundering can be defined as regulations, laws, and procedures designed to prevent criminals from cleaning illegal or dirty funds to be legitimate income. There are various anti-money laundering policies such as rule-based policy, risk-based policy, enforcement and detection, and general data protection regulation (Xia et al., 2022). Firstly, the rule-based policy deal with the framework designed to prevent, detect, and suppress illicit financing. The principles of the rule-based policy are transparent and clear policies that can be easily adopted by financial institutions as a way to ensure compliance. These rules are used to detect suspicious financial behaviour. However, the high level of transparency of such rules makes it very easy to bypass. Secondly, a risk-based policy allows the financial institution more discretion concerning what to report. This means they are responsible for reporting which can lead to over-reporting or under-reporting. As such, financial institutions are free to assess transaction risks and client risks by detecting outlier behaviour. Thirdly, enforcement and detection deal with making money laundering a criminal act. This means that different countries may have different law enforcement methods given that we do not have a "one-size-fits-all" approach to enforcement. Some of the commonly used methods include sanctions, demanding transparency from financial institutions, exports and imports monitoring, filing of financial statements, blacklisting suspicious countries and individuals as well as institutions, prison sentences, fines, and penalties. Fourthly, general data protection regulation addresses the issues related to data ownership, data processing, ethical compliance, and explanatory frameworks for the data and algorithms.

1.3 Money Laundering Stages

In the existing money laundering literature, three phases have been identified which can be used to explain the money laundering process. These three phases are placement, layering, and integration. Firstly, the placement phase is whereby the revenue from illegal or criminal activities is converted into financial instruments, or the cash is deposited in a financial institution. Secondly, the layering phase is whereby the funds from illegal activities are transferred to a network of individual or financial institutions via cheques, wire transfers, money orders, and other techniques. The money launders have the robust capabilities and competencies of utilising advanced technology like electronic payments, online banking, and cryptocurrencies to move dirty cash across the world (Bissett et al., 2023). Thirdly, the integration phase is whereby legitimate assets and properties are being purchased using funds from illegal activities. Integration can also be in the form of continuous financing of criminalised entities. At this final phase of money laundering, illegitimate money becomes part and parcel of the legitimate economy.

1.4 Money Laundering in Southern Africa

It is an open secret that the Southern African countries are not immune to money laundering just like other countries across the globe. African countries in Southern Africa are listed as causing significant threats when it comes to money laundering like Botswana, Zimbabwe, and Mauritius (Issah et al., 2022). South Africa is also facing difficulties in dealing with money laundering given that the money launders are well-connected with high-profile individuals. In this regard, Madonsela (2019, p. 123) documented that "the Gupta leaks revealed that between August and September 2013, an amount of R84 million was transferred to a Gupta-owned company, Gate Way Limited, in Dubai. Dubai was a money laundering shop. However, the money immediately left the account again. The items billed by Linkway amounted to R30 million. By 23 September, all of the Free State's money was washed and delivered to the Guptas in South Africa". This implies that South African money launders are dealing with people outside the country, especially Dubai. Moreover, the Gupta investigation revealed that the "Guptas moved the proceeds of their business through their shell company called Homix. Shell companies provide the owner with anonymity and are a classical vehicle for money laundering and other illicit financial activities. The term 'shell company' generally refers to limited liability companies and other business initiatives with no significant assets or ongoing business activities" (Madonsela, 2019, p. 123). Notably, it has been reported that the Gupta family was also dealing with some public enterprises such as Eskom. Moreover, it was reported that "Bank of Baroda not only failed to report the highly suspicious activities on the Guptas and their associates' bank accounts but enabled the Guptas to perpetuate their unlawful activities of money laundering" (Zondo, 2022, p. 841). In trying to deal with money laundering, the government managed to set aside ZAR265.3 million for the Financial Intelligence Center to update the anti-money laundering infrastructure.

Following the implementation of the Mutual Evaluation Report (MER), Zimbabwe made some amendments to the Money Laundering and Proceeds of Crime Act and began to execute risk-based supervision frameworks. More interestingly, the Financial Intelligence Unit was also established in Zimbabwe by the Reserve Bank of Zimbabwe. Put simply, the anti-money laundering frameworks in the Zimbabwean context are established through the Money Laundering and Proceeds of Crime Act of Chapter 9:24. This legal framework was amended in 2020. It now gives the government the right to identify, trace, freeze, seize, and eventually confiscate unlawful proceeds from all crimes and acts of terrorism. Interestingly, the Reserve Bank of Zimbabwe, through the Financial Intelligence Unit, works closely with Zimbabwe Revenue Authority (ZIMRA) in combating money laundering in the country when it comes to exports and imports business transactions.

Despite the existence of legal frameworks to deal with money laundering in Zimbabwe, it is discouraging to mention that it appears to be struggling to adhere to international measures related to anti-money laundering and terrorism financing. This is substantiated by skyrocketing money laundering crimes in the Zimbabwean financial sector. For instance, in mid-2020, Ecocash was placed under investigation when it created a fake mobile money platform that allow purchasing of foreign currency on the black market (Chitimira & Ncube, 2021). This implies that the customer's due diligence was not properly done since some customers were using fake identity documents which led to fake mobile money accounts.

1.5 Artificial Intelligence and Money Laundering

In a quest to combat money laundering, it appears that artificial intelligence in the financial sector can play a paramount role given that advanced technology is reshaping the contemporary business world. With this in mind, it is not surprising to note that artificial intelligence models and approaches can be utilised in the Know Your Customer and Customer Due Diligence processes. The advanced models can allow bankers to detect suspicious businesses through outlier detection software. Consequently, customer behaviour can be monitored automatically as shown by the diagram;

As illustrated in Fig. 1, artificial intelligence approaches can be utilised in determining risk scores and client characteristics. In this respect, robust customer profiling can be ensured by applying artificial intelligence tools in trying to establish the internal people, and external profile, validate Know Your Customer, adverse media, and product holdings. Moreover, the application of artificial intelligence gives room for managers to determine the customer or client links such as known account links, legal entity links, common counterparts, and social networks. Going forward, as indicated in Fig. 1, artificial intelligence in the context of Know Your

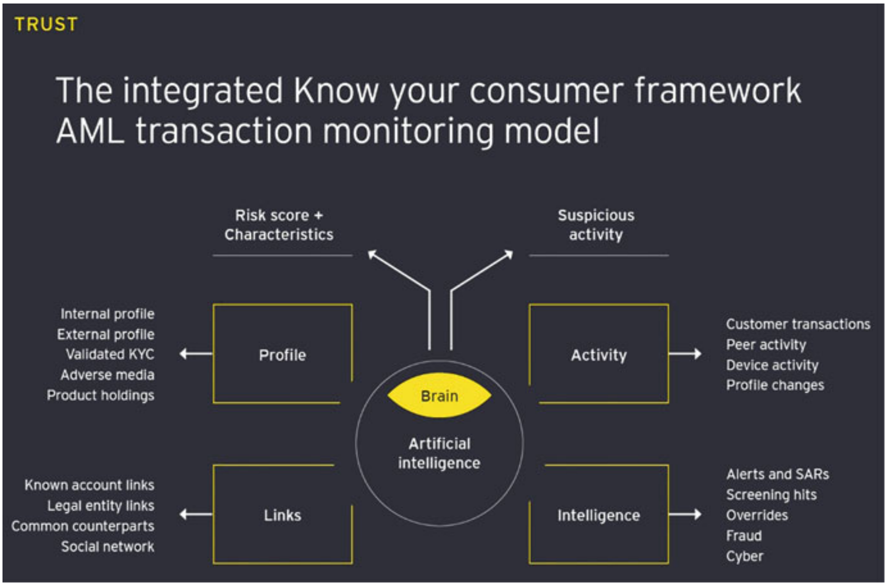

Fig. 1 Integration between Know Your Customer and artificial intelligence. Source: Craig (2019)

Customer can allow financial institutions to establish customer activities. These activities can be customer transactions, peer activities, device activity, and profile changes. On the aspect of intelligence, financial institutions can ascertain and scrutinise alerts, screening hits, overrides, cyber, and fraud. In light of the above analysis, it is clear that the application of artificial intelligence models can allow financial institutions to have a deeper understanding of their customer's behaviour over a given period of time.

Artificial intelligence can be applied to various stages of money laundering, that is, placement, layering, and integration. In this context, commonly applied tools like random forest (RF) and Support Vector Machines (SVMs) allow financial institutions to classify fraud business transactions employing large and annotated datasets. According to Tang and Yin (2005), artificial intelligence tools are usually applied at both placement and layering stages when large financial data is used to monitor business transactions conducted by the client. Integration as the final stage is very cumbersome to detect since the money has passed the possible detection stages. However, some of the artificial intelligence approaches are being proposed such as news data and enterprise relationships by extracting data from social media in an effort to monitor money laundering at the integration phase. Despite the availability of various money laundering cases, much less is known about money laundering in Southern and Eastern Africa (Basel Institute on Governance, 2020; Goredema, 2004; Issah et al., 2022). More worryingly, an interaction between artificial intelligence and money laundering is under-researched in Southern Africa.

2 Methodology

This study adopted a structured literature review methodology to comprehensively analyse the fragmented literature related to the interaction between artificial intelligence and money laundering. According to Armitage and Keeble-Allen (2008), a structured literature review encompasses a review of a plethora of literature sources with the aim to map science in a specific field of study. The structured literature review offered the researcher an opportunity to critique and evaluate the existing literature in an effort to unpack and identify possible research agendas (Dumay et al., 2016; Massaro et al., 2015; Paul & Criado, 2020; Paul & Feliciano-Cestero, 2021). In the context of this study, the Scopus database, Google Scholar, and other grey sources were used as secondary sources of data. More interestingly, Adams et al. (2017) suggested that grey literature can be used to augment the impact and relevance of organisation and management studies. The first and second tiers of grey literature such as book chapters, a broad range of journals, think-tank reports, government reports, news articles, company publications, and non-governmental organisation (NGOs) studies were used as recommended by Adams et al. (2017). There has been an exponential upsurge in the number of grey literature sources in recent years.

To ensure methodological rigor, this study adopted the following steps that were put forward by Massaro et al. (2015) when it comes to structured literature methodology: define the research question; write a research protocol for the review; determine the articles to include and carry out a comprehensive literature search; develop a coding framework; code the articles and ensure reliability; and critically analyse and discuss the results. In terms of the bibliometric analysis using data extracted from the Scopus database, "money laundering" and "artificial intelligence" were used as the keywords as follows: TITLE-ABS-KEY (money AND laundering AND artificial AND intelligence) AND (LIMIT-TO (PUBYEAR, 2022) OR LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018) OR LIMIT-TO (PUBYEAR, 2017) OR LIMIT-TO (PUBYEAR, 2016) OR LIMIT-TO (PUBYEAR, 2015) OR LIMIT-TO (PUBYEAR, 2014) OR LIMIT-TO (PUBYEAR, 2013)). In this respect, 76 documents were extracted for the past 10 years (2012 to 2023). The articles published in 2023 were excluded and non-English articles. Moreover, only articles were considered for bibliometric analysis in this study.

3 Results and Discussion

The bibliometric results provided evidence related to the interaction between money laundering and artificial intelligence. The results revealed that the adoption of artificial intelligence in combating money laundering is gaining traction in the existing body of literature, especially in the context of the financial sector. The

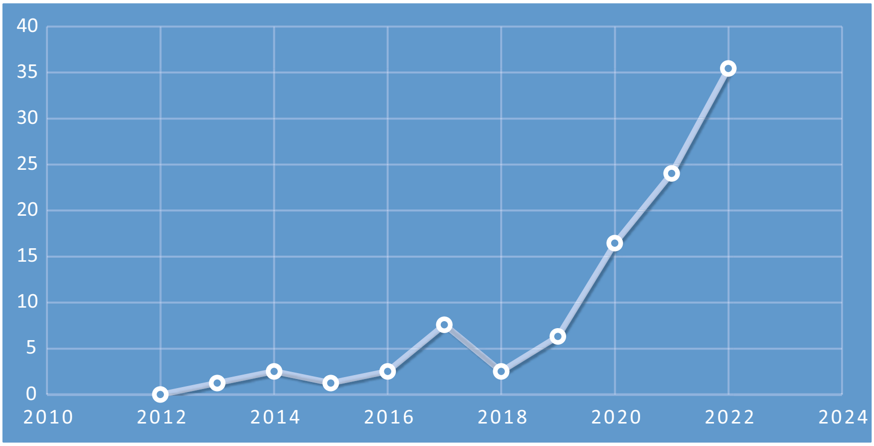

Fig. 2 Publication statistics per year from 2012 to 2022

bibliometric results permitted the researcher to have a deeper understanding of the general developments in money laundering and artificial intelligence as follows:

As illustrated in Fig. 2, it is observable that there is an increase in publications related to money laundering and artificial intelligence from 2011 to 2022. More interestingly, there was a sharp upsurge in the number of publications from 2018 (2.53%) to 2022 (35.44%). This implies that the researchers were more interested in how artificial intelligence can combat money laundering given the increase in adoption of digital transformation during the COVID-19 pandemic era.

The researcher went further to establish the bibliometric coupling of countries in an effort to establish the most productive countries when it comes to knowledge production in the context of money laundering and artificial intelligence. In this respect, the bibliometric results are presented in the following Fig. 3:

The information presented in Fig. 3 is linked to the inclusion criteria of countries that were based on a minimum number of publications per each country of 2 documents. Of 44 countries, 23 countries were eligible for analysis. The United States was the most productive country with 10 documents followed by India and the United Kingdom both with 9 documents. China was associated with 5 documents following India and the United Kingdom. Cluster analysis related to bibliometric analysis revealed that *Cluster 1* consisted of 10 countries (Brazil, Canada, China, Colombia, Germany, Italy, Russian Federation, Switzerland, United Kingdom, and the United States), *Cluster 2* with five countries (Bahrain, Hungary, India, Poland, and Taiwan), Cluster 3 with four countries (Australia, Malaysia, Netherlands, and South Korea), and Cluster 4 with two countries (France and the United Arab Emirates).

In terms of science mapping, the bibliometric analysis of co-occurrences of keywords was performed. As such, a minimum number of occurrences of 5 was

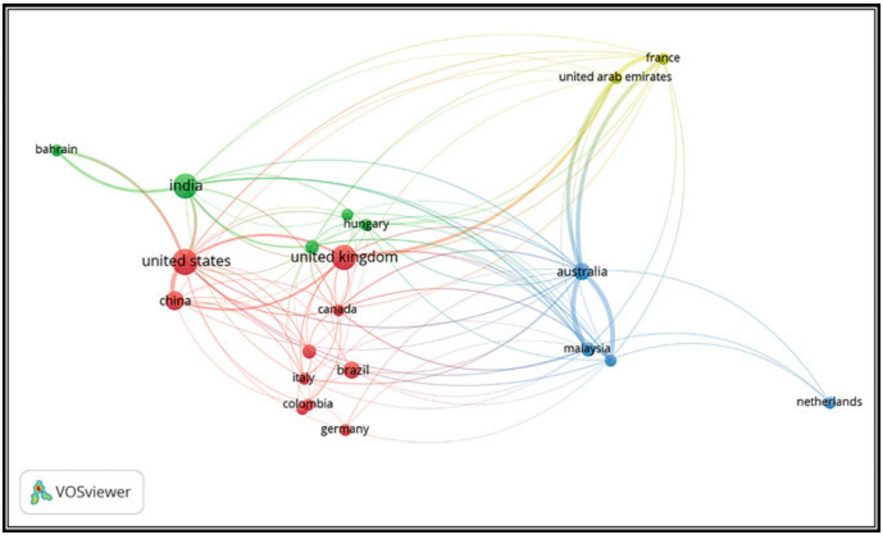

Fig. 3 Bibliometric coupling of countries

used as the threshold. Of the 568 keywords, 19 met the threshold. In this respect, the results are presented in Fig. 4.

The results reported in Fig. 4 show that "artificial intelligence" was the most reoccurring keyword with 56 occurrences followed by "anti-money laundering" with 27 occurrences. Next to anti-money laundering is "laundering" with 26 occurrences and then followed by "money laundering" with 24 occurrences. Nevertheless, it was observed that "computer crime", "financial crime", "terrorism", and "data mining" were associated with the least occurrences of 5. Notably, both "financial fraud" and "deep learning" were just slightly above with 6 occurrences. In the case of cluster analysis of the co-occurrences of keywords, three clusters were extracted from the bibliographic data, that is, the first cluster with 8 keywords (anti-money laundering, data mining, deep learning, financial institution, laundering, learning systems, machine learning, and money laundering), second cluster with 6 keywords (anomaly detection, computer crime, crime, financial crime, financial fraud, and fraud detection), and third cluster with 3 keywords (artificial intelligence, blockchain, finance, risk assessment, and terrorism).

Following the bibliometric analysis of the existing literature on the interaction between money laundering and artificial intelligence, the researcher analysed the literature from Google Scholar and some grey sources such as organisational documents in order to establish the effects of artificial intelligence on money laundering. The positive effects of artificial intelligence on money laundering were established. These are detecting money laundering activities, enhancing legal compliance, augmenting customer behavioural analytics, detecting money laundering networks, robust financial crime risk computation, and informing evidence-based policy formulation. They are discussed as follows:

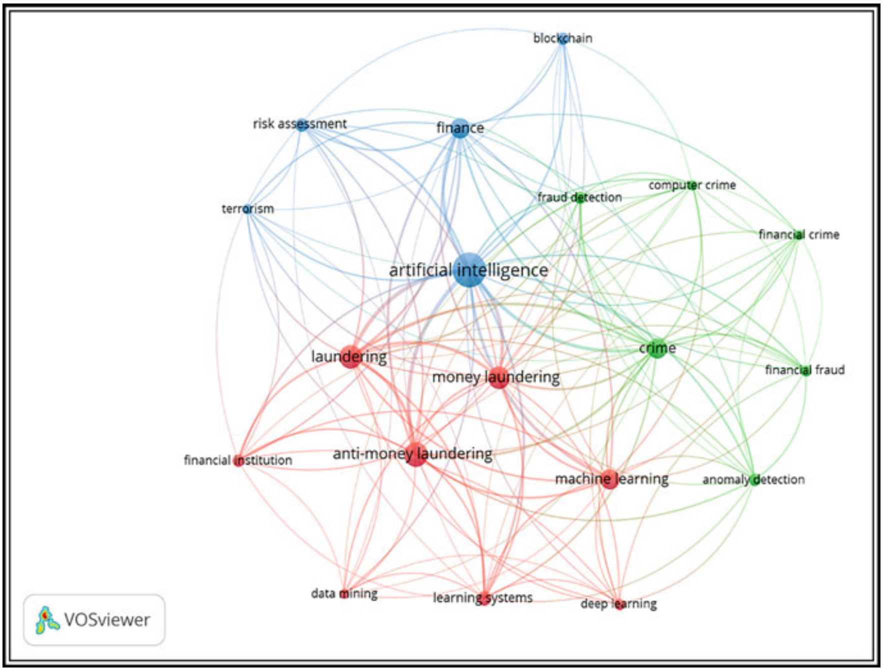

Fig. 4 Co-occurrences of keywords

3.1 Detecting Money Laundering Activities

Detection of money laundering activities emerged as one of the positive effects of the adoption of artificial intelligence in an effort to combat money laundering in the financial sector. It is worth mentioning that detecting money laundering activities is at the center of the anti-money laundering agenda. This can be done by applying the data mining tools. This is supported by some of the extracts from the existing literature, *"due to the high volume of daily transactions in banks and financial institutions, the possibility of automated systems that can interact with the massive data, is essential. Methods of detecting money laundering in these systems are usually based on provisions, which include a set of predefined rules and threshold values"* (Salehi et al., 2017). Moreover, *"in a real-life setting, the procedure to detect suspicious transactions would be run through all transactions for a certain time period"* (Jullum et al., 2020). Based on the information, it is apparent to observe that artificial intelligence can help financial organisations in detecting money laundering activities by applying advanced technologies like deep learning, machine learning, and network analysis robust models. With the adoption of artificial intelligence, higher levels of due diligence are enhanced in a manner that can allow the banks to detect suspicious financial transactions normally done by Politically Exposed Persons (PEPs) and high net worth individuals as well as blacklisted persons. Enhanced due diligence is a risk-based approach that aims to identify, assess, and mitigate the risk of money laundering, terrorist financing, and other financial crimes.

3.2 Enhancement of Legal Compliance

The application of artificial intelligence promotes the enhancement of legal compliance. It is an open secret that financial institutions are required to observe the legal provision related to money laundering and terrorism financing, As such, artificial intelligence technologies can play a significant role in promoting legal compliance. A thorough literature review showed that *"AML/CFT laws have created a large industry of compliance technology, processes, regulators and professionals, who focus almost exclusively on better compliance processes and technology. Like many regulatory structures, AML/CFT has taken on a life of its own, with a tendency to look for ever bigger and better technological solutions to detect illegal activity"* (Bertrand et al., 2020). Interestingly, Domashova and Mikhailina (2021) documented that *"the model can be used to form a list of the most important indicators for early detection of organisations involved in money laundering and terrorist financing (ML/TF), as well as to develop adequate recommendations to improve the compliance control process. A software tool in Python was developed that allows solving the tasks of early detection of organisations prone to money laundering"*. This suggests that anti-money laundering technologies can assist financial institutions in augmenting their compliance control process. In the context of Zimbabwe, the Reserve Bank of Zimbabwe sets up rules and regulations that financial institutions must follow in order to detect and monitor suspicious transactions. The Zimbabwean banks are expected to produce suspicious transactions report that is generated daily by the system which monitors transactions done by customers if they are in line with their KYC requirements.

3.3 Augmenting Customer Behavioural Analytics

The augmentation of customer behavioural analytics emerged as another positive effect of adopting anti-money laundering technology in the financial sector. Customer behaviour can be analysed using artificial intelligence technologies since different types of customers may present different levels of risk. For instance, PEPs and high-profile customers or PEPs may be more likely to use their positions of power to facilitate illicit financial activity. This is supported by Jensen and Iosifidis (2023) who suggested that *"client risk profiling is characterised by diagnostics, i.e., efforts to find and explain risk factors. The literature on suspicious behaviour flagging is characterised by non-disclosed features and hand- crafted risk indices"*. Moreover, *"compliance teams are also leveraging advanced analytics in a* *range of preventative financial crime use cases including enriching the KYC process, enhancing sanctions screening performance, and monitoring transactional activity, helping to proactively identify risks and opportunities"* (EY Global, 2021). With the application of advanced decision-making models, financial institutions can look at transaction types. Notably, certain types of transactions may also be more likely to be associated with money laundering. For example, large cash deposits or withdrawals and wire transfers to high-risk jurisdictions may raise red flags.

3.4 Detecting Money Laundering Networks

The detection of money laundering networks is another theme that emerged from the study when it comes to the positive effects of artificial intelligence on money laundering. Given the effective adoption of artificial intelligence, financial crimes like money laundering can be reduced. In this context, Lokanan (2022) documented that *"banks must adopt cutting-edge technologies like machine learning (ML) and artificial neural networks (ANN) to stay competitive and detect financial crimes. ML is a form of AI that allows computers to learn from data, identify patterns, and make predictions. Banks are already using this technology to detect fraud, assess risk, personalise customer service, and process and interpret large amounts of data. ML technology is particularly well-suited for credit scoring and money laundering detection tasks"*. In a similar vein, *"more efficient methods of detecting financial transactions could lower the false-positive rate while decreasing or maintaining the number of false negatives - and potentially more accurately detect suspicious transaction typologies within the financial transaction network. A typology is a term used in the field of anti-money laundering"* (Visser & Yazdiha, 2020). There are transaction monitoring software that can be applied when monitoring financial transactions and identifying suspicious activities. The KYC databases can be utilised in screening customer transactions.

3.5 Robust Financial Crime Risk Computation

A thorough analysis of the available literature revealed that the adoption of artificial intelligence by financial institutions helps in ensuring robust financial crime risk computation. In this context, Danielsson et al. (2022) accentuated that *"AI will give the financial authorities better access to financial information, the regulators may increasingly prefer to exercise control over private sector institutions' risk appetite, as they already do extensively"*. Furthermore, *"artificial intelligence/machine learning (AI/ML) predictive models can help process credit scoring, enhancing lenders' ability to calculate default and prepayment risks* (Boukherouaa et al., 2021). Moreover, *"all indications are that AI technology is here to stay and will become an* *increasingly important tool in risk monitoring, modeling, and analytics. Risk professionals will likely have to broaden their abilities, melding domain expertise with highly quantitative and technical skills"* (Ahmed et al., 2023).

3.6 Informing Evidence-Based Policy Formulation

It emerged that information extracted from artificial intelligence in the financial sector informs evidence-based policy formulation when it comes to money laundering. It has been noted that policymakers are in need of evidence when formulating laws. In this regard, Surkov et al. (2022) highlighted that *"many of these complex algorithms have become critical to the deployment of advanced AI applications in banking, such as facial or voice recognition, securities trading, and cybersecurity"*. This can be achieved by strengthening AML laws and regulations, and the government increasing the penalties for money laundering. Also, organisations can enhance their customer due diligence procedures to better identify and verify customers, assess their risk level and monitor their transactions for suspicious activities.

On the other hand, there are negative effects of artificial intelligence on money laundering in the sense that it can lead to infringing on customer privacy. The adoption of artificial intelligence can lead to data security and privacy issues which can lead to a situation whereby customers can reject artificial intelligence-based interfaces. Moreover, poor data governance emerged as the challenge that can emanate from the adoption of artificial intelligence in trying to curb money laundering. It is within this context that Thowfeek et al. (2020) documented that *"poor data quantity and quality as a highly underestimated key challenge in the implementation of AI in the banking sector. The realisation of the AI system's benefits is primarily dependent on its prior training which requires data input and output, and an adequate amount of training data"*. The challenges faced by AML in Zimbabwe are related to the informal economy which is large. It is very difficult to track and regulate financial transactions done by Small and Medium Enterprises. Many people and businesses operate outside the formal banking system, which can make it easier to launder money. Corruption is a major issue in Zimbabwe, and it has undermined efforts to combat money laundering. Corrupt officials may be more likely to turn a blind eye to suspicious financial activities.

4 Implications of the Study

This study on the interaction between artificial intelligence and money laundering is connected to theoretical and practical significance. As such, this study proffered evidence related to the effects of artificial intelligence on money laundering. This comprehensive review of scattered and fragmented literature related to artificial intelligence and money laundering extends the boundary of existing knowledge.

More importantly, the results of this study help the leadership of financial institutions in the sense that they should embrace artificial intelligence technologies. This could help financial institutions to improve money laundering compliance processes. Interestingly, the knowledge and understanding of the application of artificial intelligence in combating money laundering can assist when assessing the risk profiling of customers. The financial institutions should up-skill their personnel and up-scale their business intelligence projects. Moreover, the policymakers should advocate for the adoption of artificial intelligence in order to strengthen the money laundering regulatory framework. This could strengthen transparency and accountability in the money laundering monitoring process.

5 Areas for Further Research

Based on the bibliometric results from this study, it is evident that little is known about the interaction between artificial intelligence and money from an African perspective. Using the Scopus database, it emerged that South Africa was the only African country that produced two publications pertinent to artificial intelligence and money laundering. Given this gap in the existing literature, it is recommended that more research studies are required from an African perspective with the purpose to extend our understanding of artificial intelligence and money laundering. Moreover, comparative studies between African countries are welcomed so as to capture some of the contextual factors that can influence the effectiveness of artificial intelligence in combating money laundering.

6 Conclusion

This study concentrated on the effects of artificial intelligence on money laundering. Despite the availability of various money laundering cases, much less is known about money laundering in Southern and Eastern Africa. As such, this study adds value through a comprehensive literature review. This has been done by applying bibliometric analysis using the Scopus database. Moreover, some grey sources were incorporated into the thematic analysis. The results established six positive effects of artificial intelligence on money laundering. These themes are detecting money laundering activities, enhancing legal compliance, augmenting customer behavioural analytics, detecting money laundering networks, robust financial crime risk computation, and informing evidence-based policy formulation. However, the negative effects are in the form of infringing customer privacy rights, and poor data governance. Despite the existence of few negative effects, it is concluded that artificial intelligence helps to combat money laundering in the Southern African region. As such, it is suggested that financial institutions should up-skill their personnel and up-scale their business intelligence projects.

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An Analysis of the Application of King IV Disclosures by South African State-Owned Entities

Busisiwe Ncube, Naledi Nkhi, and Lindani Myeza

Abstract The purpose of this study is to evaluate the extent of (State-Owned Entity) SOE compliance with the principles and disclosure requirements of King IV over time. The study uses agency theory to contextualise the conflicting interests of society, government, and management of SOEs. This study uses content analysis to measure King IV compliance existing in the integrated reports of SOEs. The results portray a negative picture regarding the compliance of SOEs with the principles of best practice as contained in King IV. Further, the range of stakeholders involved complicate accountability for SOEs. SOEs are crucial for the development of the country's economy whether it be through the creation of employment, infrastructure development or service delivery. It is important that SOE achieve good corporate governance and remain transparent, and accountable for their actions.

Keywords Corporate governance · King IV · Compliance · Integrated reporting · SOEs · PFMA

1 Introduction

State-owned enterprises (SOEs) play an essential role in the economy of South Africa, namely, assisting the government to achieve its objectives and facilitating the delivery of services and infrastructure. The Public Finance Management Act 1 of 1999 (PFMA) categorises SOEs into different schedules and this study focuses on Schedule 2 of the PFMA. The key SOEs in the PFMA are found in Schedule 2 and include sectors such as infrastructure, finance, national security, and social sectors. These SOEs contribute a significant 8.5% to the GDP of the country (Beukes, 2019). Maintaining this contribution ought to be a priority and good corporate governance practices can assist with that goal (Beukes, 2019).

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Corporate governance in a South African context is defined by the King IV Report (King IV) as “the exercise of ethical and effective leadership by the accounting authority towards the achievement of ethical culture, excellent performance, effective control, and legitimacy” (IODSA, 2016, p. 11). Corporate governance promotes transparency, integrity, and accountability and facilitates efficient service provision from SOEs (Mbecke, 2014).

Integrated reporting is a major component of King IV and allow users of financial statements to evaluate the performance of SOEs taking into account qualitative and quantitative factors (Roberts, 2017). Integrated reporting promotes the importance of various stakeholder groups which is specifically crucial for SOEs that have a delicate mix of stakeholder interests to balance (Surty et al., 2018). Further, SOEs in South Africa have made commitments to apply King IV (Mans-Kemp et al., 2016).

The main difficulty for SOEs lies in the role of government as the controlling shareholder, resulting in political interference and ultimately weakening corporate governance structures (Thabane & van Deventer, 2018). Further, the government also plays a role in relation to the society who vote for them and for whom they must deliver services. This is vastly different from the private sector where the principal and agent can be clearly delineated.

The purpose of this study is to evaluate the extent to which SOEs comply with the principles and disclosure requirements of King IV. The study evaluates whether the extent of compliance has changed over time. The author examines a period of 4 years from 2018 to 2021. The reason for this is that the SOEs in schedule 2 of the PFMA had not applied King IV in their 2017 year of assessments, as King IV only came into effect from November 1, 2016, and applied to entities with a financial year end after 1st April 2017.

Resolving corporate governance challenges can result in improved performance of SOEs as part of a “comprehensive and contextually relevant approach that also includes policy reforms, restructuring, external incentives, such as increased competition, and more private sector participation, as well as fiscal discipline” (Mashamaite & Raseala, 2018, p. 282).

Research regarding King IV compliance are plentiful and relate mainly to the publicly listed companies. At the present time, to the author’s knowledge, a small body of research exists relating to King IV compliance by SOEs.

The study was conducted using SOEs found in Schedule 2 of the PFMA, which may not provide a full and accurate representation of the wide range and type of SOEs in South Africa. The study does not conduct any interviews of the individuals involved in preparing the integrated reports of SOEs to try and explain the reason for compliance or non-compliance with King IV, as this lies beyond the scope of this research.

2 Literature Review

2.1 Theoretical Framework: The Agent-Principal Problem

Agency theory is a way to interpret corporate governance, and to explain the causes of agency costs and issues (Tladi & Madue, 2022). Eisenhardt (1989) asserts that humans will always act in a way that benefits them. Imbalances in the information available to managers in comparison to shareholders could result in inappropriate behaviour by the former (Tladi, 2021). The principal needs information to make decisions about the SOE as well as hold the agents accountable, where agency theory encourages transparency and disclosure (Royo et al., 2019). Corporate governance offers a solution to these problems and achieves alignment of the shareholder and management objectives (Humayun & Adelopo, 2012).

SOEs differ from private entities, as they do not always seek to maximise profits, they also cater for the needs of citizens, which in turn undermines the possible value of the classical agency theory (Dawson et al., 2016). The crucial issues SOEs are exposed to include that SOEs have multiple stakeholders with differing interests (Kamal, 2010b). These different stakeholders are the government and society, while the different agents are the boards appointed by the government and officials appointed by the citizens (Dawson et al., 2016). Society's (the public's) interests are ultimately the responsibility of the government entities that have ownership rights over SOEs. In carrying out this duty, the state as owner owes obligations to society that are akin to the fiduciary responsibilities a board has to its shareholders. High standards of accountability and openness are thus required in this regard so that society can be satisfied that the government is acting in their best interests. The relationship is displayed in Fig. 1.

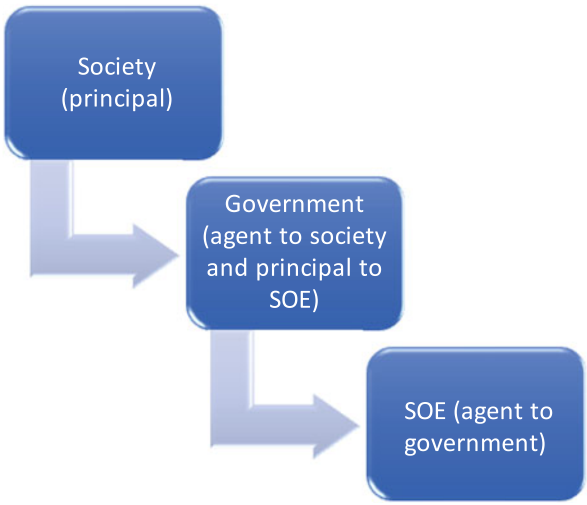


Fig. 1 A figure showing the agent-principal problem between society, government and management of SOEs. Source: Dawson et al. (2016)

SOEs are answerable to numerous stakeholders, namely, "parliament, government, society, investors and credit- rating agencies" (Kathrada et al., 2021, p. 2). The achievement of good corporate governance is hampered by the lack of methods to identify the real owner of an issue and hence who should be accountable. This makes corruption more prevalent in SOEs (Royo et al., 2019).

As an agent of the society, governments are responsible for the effective functioning of the day-to-day activities of the SOE; and as the owner, they have a duty to take decisions that are beneficial for the *ultimate owner* (society) (Kamal, 2010b). During a sitting of the national assembly held in parliament, it ends up being unclear who is responsible for the supervision of the SOE (Musacchio & Lazzarini, 2018). The managers of the SOE are expected to meet the needs of an unusual combination of stakeholder, which includes both government and the society it serves (Mehmood, 2021).

Government/Politicians (Principal) and Directors of SOEs (Agents)
As a stakeholder, government might try to use SOEs for their benefit rather than the benefit of society, for example, by appointing board members for political reasons (Zejnullahu, 2020). This will allow them to obtain more support, which will assist them during elections, promoting political longevity (Cunha et al., 2021). Ministers may use the SOEs to benefit themselves financially and politically (Zejnullahu, 2020). The government acting as the principal opens up the risk of political involvement in the SOEs and affects director's ability to do their job as required (Thompson et al., 2019).

Government usually has more control and power in SOEs than other shareholders, and often has different needs from management, which exasperates agency problems (Mehmood, 2021).

Society (Principal) and Government (Agent)
SOEs are meant to maximise the livelihoods of citizens, but elected officials may not act in the best interests of the citizenry (Kamal, 2010a). In contrast to private or listed companies, society are not easily able to monitor the performance of government. There are conflicts of interest between the manager and the owner that arise due to differences in interests as elected officials will be inclined to act towards their own interests (Zejnullahu, 2020). The shareholder in charge (Minister) has a different interest from that of society, as the Minister may want to maintain the power they hold, while the society requires better service delivery from SOEs (Cuervo-Cazurra et al., 2014).

Government nominates the individuals that make up the board (both executive and non-executive). The hiring of individuals due to political connections results in competence being overlooked (Moyo, 2016). Accountability and transparency are important for the purposes of decreasing information failure between stakeholders and executive management (Smith, 2020). Accountability serves to evaluate the closeness of the agent's decisions to what the principal expects (Mbecke, 2014).

2.2 Importance of SOEs

SOEs are defined as entities where the government holds at least 50% of the shares (Matsiliza, 2017). This study will refer to SOEs as defined in the PFMA. The PFMA defines SOEs as "a juristic person under the ownership control of the national executive that has been assigned financial and operational authority to carry on a business activity as its principal business, provides goods or services in accordance with ordinary business principles, and is financed fully or substantially from sources other than

(i) the National Revenue Fund; or
(ii) by way of a tax, levy or other statutory money" PFMA (2010, p. 8)

There are three important reasons for SOEs to exist. The first is for political reasons, where economic interventionism encourages employment, reduces income equality (Mathebula & Masiya, 2022). The second reason is social, which aims to increase employment and ensure employees have good working conditions (Royo et al., 2019). The third reason is economic, as SOEs have the power to address market failures, by creating a powerful public sector.

Undeveloped communities that cannot afford basic resources are catered for by SOEs, ensuring economic development. The responsibility of significant infrastructures is placed on SOEs (Sadiki, 2015). Kotze (2019) and Stevens (2021) state that SOEs play an important role in the growth of the economy, by boosting economic stability, the confidence of the investors, employment rates, and bringing in foreign investments.

Stevens (2021) found that several SOEs have had substandard performance, Eskom being among the worst of them. This lacklustre performance seriously undermines the importance of SOEs and their potential to contribute to the growth of the economy.

2.3 The State of Corporate Governance in South African SOEs

By design, SOEs are supposed to be self-sustaining, yet it has become a norm in South Africa that they receive government bailouts (Tladi & Madue, 2022). There have been countless claims over the inadequate accountability by SOEs over the last decade, which shows inadequate corporate governance on the part of SOEs generally (Tladi & Madue, 2022). The extensive financial contingency provided by government is shown to lower the operating standards upheld by those managing SOEs (Surty et al., 2018). Corporate governance in SOEs usually includes equalising the goals of economic growth and provision of goods and services on behalf of government and society (Ackers, 2022).

The State Capture Report brought to light the poor corporate governance application by certain SOEs, namely, Eskom, Transnet, DENEL, SAA and SABC. These are also the worst performing SOEs, and one could conclude that this may be due to the deficiency in corporate governance (Stevens, 2021).

Moyo (2016) found that South African SOEs have experienced difficulties in the application of corporate governance. The number of officials involved in fraudulent activities who have subsequently been investigated and prosecuted is quite inconsequential (Moyo, 2016). Khumalo and Mazenda (2021) found a direct link between the inadequate consequence management and the low level of good corporate governance.

The responsibility for the governance of SOES falls to parliament, the executive authority, and the board of directors (Marimuthu & Kwenda, 2019). Marimuthu and Kwenda (2019) found evidence that there are traces of political involvement in SOEs, as well as fruitless and wasteful losses taking place. An example of how political involvement could occur is where financially adverse projects are undertaken by a SOE mainly to satisfy the voters who keep the political party in power (Kamal, 2010b).

The Auditor-General South Africa (AGSA) is a Chapter 9 institution that audits most government entities. The 2020/2021 audit period highlighted SOEs in decline due to weakness in controls of financial and performance management and an overall lack of accountability from prior audit findings (AGSA, 2021b).

The following corporate governance misdemeanour have led to loss of stakeholder and investor trust in SOEs (Thomas, 2012):

– Inadequate leadership, as seen from CEO and chairperson disputes, senior job positions that are not occupied, little-to-no succession planning for senior personnel, constant changes in key executive employees, a hold up in senior appointments, which results in multiple positions being held by acting employees, and appointments that are politically motivated which results in SOEs being used for political reasons.
– Salaries and bonuses that are unreasonable as these bonuses do not consider the performance of the SOEs.
– High degree of wasteful expenditure.

2.4 Integrated Reporting in South Africa

Integrated reports inform stakeholders about the financial and non-financial performance of SOEs (Manes-Rossi, 2018). Conflicts of interest caused by the principal-agency problem can be reduced by the adoption of integrated reports containing reliable company information. Quality integrated reporting can also lead to improved transparency and accountability. The goal of integrated reports is to "explain to the providers of financial capital how an organisation creates value over time including employees, customers, suppliers, business partners, local communities, legislators, regulators and policymakers" (Manes-Rossi, 2018, p. 173). In the context of SOEs, the creation of value relates to societal value.

2.4.1 Creating the Disclosure Checklist

Corporate governance that is applied appropriately is important for SOEs in achieving their objectives. King IV includes sector supplements which further align the principles of King IV to government entities. The supplement for SOEs, which should be read in conjunction with the original principles, is applicable to the entities in Schedule 2 and 3 of the PFMA (IODSA, 2016). This rids the narrative that King IV is only meant for private entities, as it has been modified to meet the different needs of SOEs. For SOEs that are not created as companies, there will be a change in some terms, in particular, "accounting authority" will pertain to the SOE (IODSA, 2016) (Table 1).

3 Methodology

3.1 Type of Study

This study follows a quantitative approach with the use of content analysis using an exploratory research design. Content analysis is defined as a detailed and systematic examination of the contents of a particular body of material to identify patterns, themes, or biases within that material (Leedy & Ormrod, 2019).

3.2 Population and Sampling

The population for the research is all the public entities Public Finance Management Act (PFMA). The sample for this study is the public entities found in Schedule 2 of the PFMA (Table 2). The period of assessment is from 2018 to 2021 inclusive. The reason for this, is that the SOEs in Schedule 2 of the PFMA had not applied King IV in their 2017 year of assessments as King IV only came into effect from 1 November 2016, and applied to entities with a financial year end after 1 April 2017. The research ends at the latest available integrated report as the secondary aim is to analyse the extent of compliance over the years.

Table 1 A table showing the King IV principles contained in the study

Principle of King IV and requirements	Disclosure included in study
Leadership, ethics, and corporate citizenship	
Principle 1.1: "the accounting authority should set the tone and lead ethically and effectively". The SOEs should ensure that transparency, fairness, accountability, and responsibility are the foundation of how an SOE is run (IODSA, 2016, pp. 43–73)	Yes
Principle 1.2: "The accounting authority should ensure that the SOEs ethics is managed effectively".	
Principle 1.3: "The accounting authority should ensure that the SOE is a responsible corporate citizen." SOEs are answerable to the society and because of this, they must ensure that they are responsible corporate citizens."	
Performance and reporting	
Principle 2.2: "The accounting authority should ensure that reports and other disclosures enable stakeholders to make an informed assessment of the performance of the SOE and its ability to create value in a sustainable manner." (IODSA, 2016, pp. 43–73)	Yes
Governing structures and delegation	
Principle 3.1: "The accounting authority should serve as the focal point and custodian of corporate governance in the SOE."	Yes
Principle 3.2: "The accounting authority should ensure that in its composition it comprises a balance of the skills, experience, diversity, independence, and knowledge needed to discharge its role and responsibilities."	
Principle 3.3: "The accounting authority should consider creating additional governing structures to assist with the balancing power and the effective discharge of responsibilities but without abdicating accountability."	
Principle 3.4: "The accounting authority should ensure that the appointment of and delegation to, competent executive management contributes to an effective arrangement by which authority and responsibilities are exercised."	
Principle 3.5: "The accounting authority should ensure that the performance evaluations of the accounting authority, its structures, its chair and members, the CEO and the company secretary or corporate governance result in continued improved performance and effectiveness." (IODSA, 2016, pp. 43–73)	
Governance functional areas	
Principle 4.1: "The accounting authority should govern risk and opportunity in a way that supports the SOE to set and achieve strategic objectives."	Yes
Principle 4.2: "The accounting authority should govern technology and information in a way that supports the SOE to set and achieve strategic objectives."	
Principle 4.3: "The accounting authority should govern compliance with laws and ensure consideration of adherence to non-binding rules, codes and standards."	

(continued)

Table 1 (continued)

Principle of King IV and requirements	Disclosure included in study
Principle 4.4: "The accounting authority should ensure that the SOE remunerates fairly, responsibly, and transparently so as to promote the creation of value in a sustainable manner."	
Principle 4.5: "The accounting authority should ensure that the assurance results in an adequate and effective control environment and integrity of reports for better decision-making." (IODSA, 2016, pp. 43–73)	

Source: References included inside table

Table 2 Table showing the Schedule 2 SOEs as indicated in the PFMA

1. Air Traffic and Navigation Services Company
2. Airports Company
3. Alexkor Limited
4. Armaments Corporation of South Africa
5. Broadband Infrastructure Company (Pty) Ltd
6. CEF Pty (Ltd)
7. DENEL
8. Development Bank of Southern Africa
9. ESKOM
10. Independent Development Trust
11. Industrial Development Corporation of South Africa Limited
12. Land and Agricultural Bank of South Africa
13. SA Broadcasting Corporation Limited
14. SA Forestry Company Limited
15. SA Nuclear Energy Corporation
16. SA Post Office Limited
17. South African Airways Limited
18. South African Express (Pty) Limited
19. Telkom SA Limited
20. Trans-Caledon Tunnel Authority
21. Transnet Limited

Data Sources and Collection

A detailed literature review was used to design a disclosure checklist with 121 questions which assess the implementation of King IV principles. This was done using the guidance of the King IV Report's 16 recommended principles set out in Part 5 of the King IV Report and the sector supplement set out in Part 6.6 of the King IV Report. Principle 17 of the King IV Report is not applicable to SOEs (IODSA, 2016).

The disclosure requirements of King IV were assessed on the integrated reports of the relevant companies, those without integrated reports or an equivalent will be excluded. The integrated reports were sourced from the relevant companies' websites. The author searched on each of the SOE websites and confirmed that the integrated reports for the relevant year were available except in the cases of the following companies and years:

– South African Airways (SAA) and South African Express (SAE) (2017–2021). SAA has not released any financial statements since 2017 and had been placed under business rescue.
– Alexkor (2021)
– Denel (2021)
– Independent development trust (2020 and 2021)
– ARMSCOR used the King III Report in 2018
– SA Nuclear used the King III Report in 2018

3.3 Data Analysis

To answer the research question, a data analysis tool was created, namely, the disclosure checklist (which included 121 questions formulated through the King IV principles). The integrated reports were analysed by heading to determine the level of corporate governance in SOEs (Tirado-Valencia et al., 2021). In cases where King IV disclosures were identified, the author coded them using the table below. This type of coding is called the unweighted approach (Hossain, 2000).

0	Not disclosed
1	Disclosed

Microsoft Excel was used to generate the total points for each company. The author used descriptive statistics to assess trends (Nkhi et al., 2017).

3.4 Validity and Reliability

Content analysis suffers criticism for its degree of subjectivity (Bengtsson, 2016). To decrease the amount of subjectivity, the author did not analyse the state or quality of the disclosure, but rather noted whether the disclosure existed or not. The disclosure checklist was made using the checklists generated from prior studies, thus increasing the construct validity of the study.

4 Results

4.1 The Overall King IV Compliance Over the Years

The average disclosure has been increasing slightly from when the SOEs first adopted King IV in 2017 (45.16%), to 2020 (46.37%), after which it decreased in 2021 (38.71%). The extent of average disclosure has consistently been below 50%, which indicated that collectively SOEs do not comply with more than half of King IV disclosure requirements included in this study. This is to be expected, as SOEs are not required by any law to fully adopt King IV principles and practices. The extent of the disclosure saw a decline in 2021, in line with the observation by (Ackers, 2022) who found that in the 2020/2021 reporting year, organisations focused their disclosure of COVID-19 related information. It therefore comes as no surprise that SOEs also saw a decrease. Only Telkom and ACSA achieved an average compliance of above 60% and this was to be expected as they have instruments listed in the Johannesburg Stock Exchange (JSE), which would mean as part of the listing requirement they must comply with certain King IV disclosure requirements (Ackers, 2022). Evident from the results is that when there is a legal requirement financial statement reporters are pressured to comply with laws and regulations and more disclosure can be observed (Ackers, 2022).

This finding indicates that the agency-principal problem could be alleviated with the introduction of compulsory reporting information. An issue which may arise from compulsory reporting could be SOEs treating King IV compliance as a tick-box exercise, decreasing the value added.

The average disclosure matrix score is 42% (Table 3). 13 SOEs had an average score of more than 42%, this represented approximately 68% of the population. All but one of the SOEs stated in their annual report that they complied with King IV as seen on Fig. 2. This finding is in line with Ackers (2022) who discuss that a company's own assertions that they comply with King IV disclosure requirements may not portray the actual compliance of the entity (Fig. 3).

ACSA appear to be a stand-out performer in terms of the King IV disclosures observed for this study. The disclosure scores increased year on year, showing a commitment to improved corporate governance reporting. In terms of the financial performance of the SOE, the company consistently achieved a probit before tax (except for in 2021) and has unqualified audit report for all years observed. ACSA is also one of the SOEs engaged in the least amount of public political scandals which may indicate a link between reducing the agency-principal problem and good corporate governance practices.

Table 3 Average King IV disclosure compliance by SOEs over 4 years

SOEs	2018 '%'	2019 '%'	2020 '%'	2021 '%'	Averages '%'
ACSA	51	54	64	79	62
Alexkor	40	51	45	0	34
ARMSCOR	0	36	40	40	29
ATNS	51	47	45	44	47
BIC	29	37	55	53	44
CEF	45	36	50	41	43
DBSA	58	55	64	59	59
DENEL	54	57	63	0	43
ESKOM	59	55	57	57	57
IDC	43	48	45	48	46
IDT	28	26	0	0	14
LAD	63	47	51	39	50
SABC	33	31	42	41	37
SAFC	32	22	30	27	28
SANEC	0	28	29	26	21
SAPO	29	31	31	28	30
TCTA	37	46	55	37	44
Telkom	58	68	63	60	62
Transnet	58	64	51	56	57
Average	45	44	46	39	42
Average disclosure score expressed as a ~~%~~					42
Average disclosure score					51

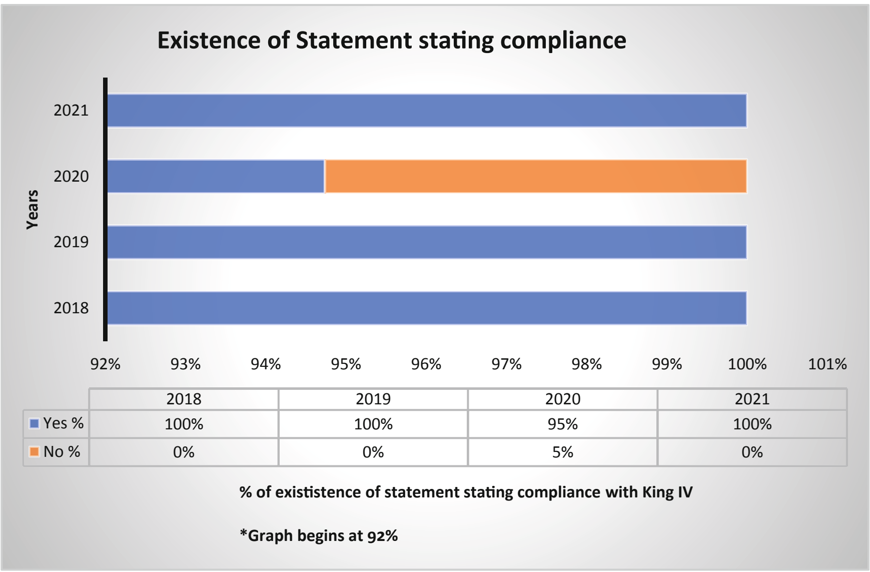


Fig. 2 King IV compliance considering whether the SOEs stated their compliance with King IV

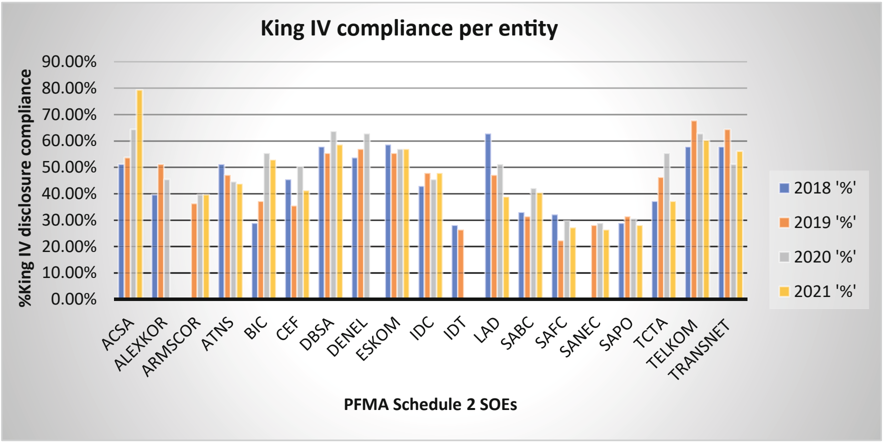


Fig. 3 A graph that shows the disclosure compliance of all the SOEs in each year

4.2 Disclosure of the Principles of King IV

This section will evaluate the individual principles of King IV (Fig. 4).

Overall, ACSA, Land Bank, Telkom, DBSA, and IDC have good ethical disclosure compliance with King IV. These entities have not been on the media for any

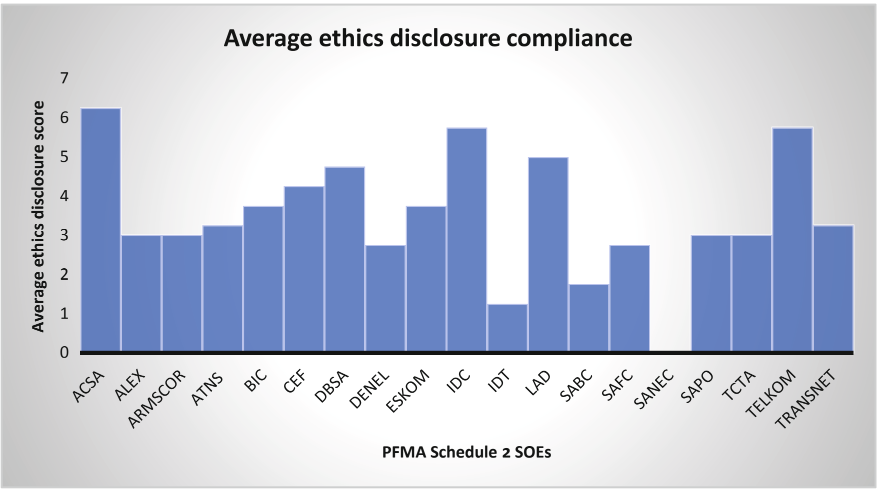


Fig. 4 Graph showing the average King IV leadership, ethics, and corporate citizenship disclosure scores by the SOEs over the 4-year period

corruption scandals during the time under review, which may indicate that they afford ethics and leadership the utmost importance, as we see a high disclosure of the King IV principles relating to ethics. Alexkor, ARMSCOR, ATNS, DENEL, IDT, SAFC, SABC, South African Post office, SANEC, TCTA and Transnet performed poorly on average regarding their King IV disclosure and these entities are often involved in corruption scandals. The SABC did not have any disclosure for ethics in 2019 and 2021. SANEC has not disclosed anything relating to ethics since 2018. The findings of this study are in tune with Stevens (2021) who found that Transnet, SABC and Denel were the worst-performing entities on the list of the SOEs that comply the least with King IV disclosure requirements.

The findings furthermore indicate that there is low transparency by the SOEs as seen from the low levels of disclosure of ethics. In 2016, Eskom was involved in its biggest scandal, which resulted in the CEO being suspended, as he was involved in fraudulent activities with the Gupta family. In 2019, two senior officials in Eskom were formally accused of fraud and corruption relating to the building of the Kusile Power Station (Eskom, n.d.) (Fig. 5).

Entities with adequate risk disclosure perform well financially if risks are identified appropriately and mitigated timeously. Most SOEs had good risk management disclosures, as they realised the importance of risk management, and hired experts to assess their risks as consistent with (Matsiliza, 2017). The presence of consultants can also be linked to political interference as it often occurs that a consultant may be hired to complete the work of an incompetent political hire (AGSA, 2021a).

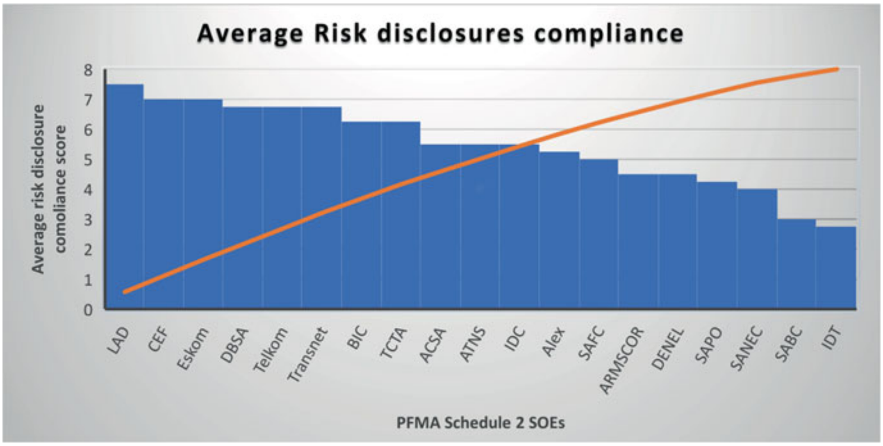
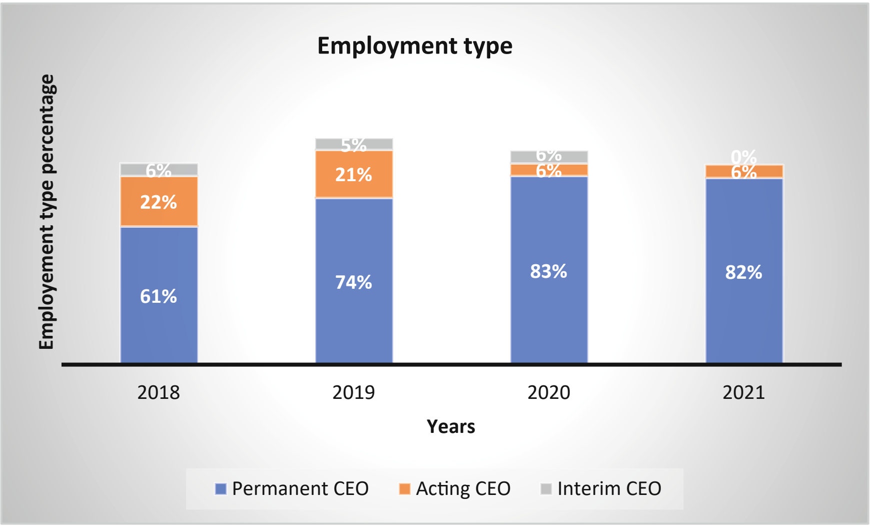


Fig. 5 Graph showing the average King IV risk disclosure scores over the four-year period for each SOE

4.3 Observations Taking Other Variables into Account (Fig. 6)

Overall, when there is a permanent CEO, King IV compliance is good. Prior literature has found that corporate governance was negatively affected by the increased vacant senior positions. (Modiha, 2018). Serongoane and Ukwandu (2021) acknowledged that effective leadership plays an important role in the state of the corporate governance of an entity. This is because senior personnel with poor ethics will result in the whole organisation having poor ethics. This is in line with the findings of (Myeza et al., 2021) that the ethics of senior management drive the ethics of junior employees. IDC had the highest disclosure of the King IV CEO requirements, while all the other SOEs either had no disclosure or the disclosure was minimal. IDT has performed poorly in all the aspects identified in this research.



Employment type	2018		2019		2020		2021	
	% of total CEOs	*Ave. dis. Score	% of total CEOs	*Ave. dis. score	% of total CEOs	*Ave. dis. score	% of total CEOs	*Ave. dis. score
Permanent CEO	61%	44%	74%	45%	83%	50%	82%	47%
Acting CEO	22%	42%	21%	41%	6%	29%	6%	28%
Interim CEO	6%	51%	5%	47%	6%	45%	N/A	N/A

**Average disclosure score for SOEs obtained under each employment category*

Fig. 6 Graph showing whether the type of employment has an impact on King IV compliance

Table 4 Table showing whether SOEs received a government bailout

SOEs	2018	2019	2020	2021
ACSA	No	No	No	No
Alexkor	No	No	No	No information
ARMSCOR	No information	No	No	No
ATNS	No	No	No	No
BIC	No	No	No	No
CEF	No	No	No	No
DBSA	No	No	No	No
DENEL	Yes	Yes	Yes	No information
ESKOM	No	Yes	Yes	Yes
IDC	No	No	No	No
IDT	No	No	No information	No information
LAD	Yes	No	No	Yes
SABC	No	No	Yes	No
SAFC	No	No	No	No
SANEC	No information	No	No	No
SAPO	Yes	Yes	No	No
TCTA	No	No	No	No
Telkom	No	No	No	No
Transnet	No	No	No	No

This is in line with AGSA (2021a) report where the IDT did not have the appropriate leadership to take decisions and lacked personnel in the CEO position. Inadequate leadership is seen in: CEO and chairperson disputes; senior job positions that are not occupied; little-to-no succession planning for senior personnel; constant changes in key executive employees; a hold up in senior appointments, which results in multiple positions being held by acting employees; and appointments that are politically motivated, which results in SOEs being used for political reasons (Table 4).

Only 16% of the population received a government bailout between 2018 and 2020, and 11% in 2021 received a government bailout. Entities that have received a government bailout include Eskom, Denel, Land Bank, and the South African Post Office. The receipt of a government bailout may increase the lack of meaningful action, because of the safety net which it provides. An example of this can be seen from Eskom as this SOE has received multiple bailouts, but still underperforms. It is interesting to note that Eskom has an average disclosure score of 57% which is higher than the average disclosure score among all SOEs of 42% (Table 3). A study by van Vuuren (2020) noted that King IV is not always meaningful and does not always represent the accurate compliance of an entity.

The consistent government bailouts counter or defer of accountability and transparency. Without accountability, SOEs are unlikely to meet the objectives of societal expectations. The tone is set from the top, meaning that government needs to serve society by holding themselves and the agents of SOEs accountable for corporate governance.

5 Discussion/Conclusion

The author investigated through content analysis the extent of the compliance of King IV by South African SOEs. The author used a checklist of 121 questions (to be provided upon request) to score the annual reports of reports prepared by 19 SOEs over a period of 4 years. The results portray a negative picture on the South African SOEs in relation to complying with best practice corporate governance principles such as the King Report of South Africa.

More specifically, the average disclosure for SOEs decreased from 2017 (45.16%) to 2021 (38.71%). Only Telkom and ACSA achieved an average compliance score of above 60%, indicating that in general, SOEs do not comply with the requirements of King IV and compliance is continuing to decline. Corporate reporting in 2021 was skewed from disclosures related to COVID and further research is required to indicate whether reporting has improved post-COVID. Unsurprisingly, SOEs overwhelmingly stated that they complied with King IV in preparing their integrated reports while obtaining quite low disclosure scores. The study also indicated that where a CEO was permanently employed, this generally resulted in higher overall King IV disclosures as opposed to where the CEO was acting in the role.

The results of this study are based on what is reported in annual reports by management of SOEs. As a result, disclosures in annual reports, possibly, may not portray the true practice in the SOEs. As an example, while integrated reports indicate compliance to international best practice corporate governance principles such as the King Report, corporate managers may meanwhile be engaging in fraudulent events, mishandling and corruption.

This study is limited in its scope, due to only focusing on a four-year period. Future research could conduct a long-term investigation of governance practices of all SOEs to determine how different SOEs in different schedules of the PFMA perform. Future research could go further by also investigating the causes of the changes in the compliance with King IV. Finally, future research may utilise a non-identical procedure in assessing compliance with best practice corporate governance principles by South African SOEs.

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Investigating the Treatment of Deferred Tax in the Debt-to-Equity Ratio

Ockert Fourie and Surika Van Rooyen

Abstract One of the most useful tools to determine financial performance is the financial statements published by a company. The objective of this study is to gain a better understanding of the treatment of deferred tax in the debt-to-equity ratio and to determine how this differs between theory and practice. The study employs a qualitative method approach to collect empirical data through interviews. Data are collected from detailed interviews with academics and professionals in practice. Even though there is a multitude of ways in which deferred tax can be treated in the calculation of the debt-to-equity ratio, participants from academia and practice overwhelmingly respond that they would rather include deferred tax as part of the debt. In so doing the item is not merely excluded, and this ensures that no unnecessary loss of information occurs. The study only focused on stockbrokers and portfolio managers who are professionals in practice. Only one input was considered regarding the debt-to-equity ratio, and many other inputs could have an impact on the calculation of this ratio. The professionals in academia only comprised two subject fields; other fields could also be taken into consideration when looking at this aspect. The study recommends that, when calculating the debt-to-equity ratio, deferred tax should be included in the calculation to ensure that the ratio remains comparable and as simple as possible. Furthermore, it is also recommended that the debt-to-equity ratio should be calculated including and excluding deferred tax and that both these ratios should be disclosed. By computing both ratios the user has the freedom to select the ratio that best suits their needs, and the impact of the deferred tax will not be ignored.

Keywords Accounting standards · Debt · Debt-to-equity ratio · Deferred taxes · Equity · Financial statement analysis · Ratio analysis

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1 Introduction

The end product of an organisation's accounting cycle is the financial statements that are delivered from this process, which provide a representation of the company's financial position and periodic performance (Albrecht et al., 2015; Robinson, 2020). Financial statements form the lens through which the business is viewed, and it is important to gain a better understanding of how entities' operations are presented through the financial statements (Penman & Penman, 2010). Jesswein (2010) contends that "financial statements are the lifeblood of finance". The importance of financial statements cannot be understated and is an integral part of an entity's operations.

Financial statements are prepared for a group of diverse users, and each one of these users has certain objectives that they want to achieve through analysis (Gibson, 2013; Robinson, 2020). By comparing the views of White et al. (2003) with that of Burke (2011), one could posit that financial statements are used by investors and creditors to make better economic decisions and guide them regarding where to place their scarce investment resources. Potential equity, debt, and credit suppliers, as well as company management, can dramatically reduce their cost of searching for financial information by using a company's general purpose financial statements (Colson, 2005). Shareholders use the financial statements of the firm to measure actual performance compared to expectations (Albrecht et al., 2015).

The comparative and relative importance of data presented in financial statements can be emphasised through various financial data analysis techniques which can be used to evaluate the position of a firm (Gibson, 2013; Robinson, 2020). The analysis of financial statements can be achieved through a variety of tools designed to meet specific needs (Subramanyam, 2014). Damjibhai (2016) states that a very powerful measurement tool that can be used to measure organisation performance is ratio analysis. Ratio analysis also serves as a prediction tool that can be used to prevent financial distress and fraudulent financial reporting (Arshad et al., 2015).

Two problems often encountered with ratio analysis are, firstly, the inclusion or exclusion of certain items in a specific ratio and, secondly, ensuring consistency. A lack of uniformity is one of the problems that arise when calculating certain ratios (Gibson, 2013; Robinson, 2020). Financial statement analysis has no standard setters, is not codified, and has no framework. It, therefore, lacks structure in contrast to financial accounting (Entwistle, 2015). There are certain aspects of the debt-to-equity ratio that can be problematic for an analyst, specifically the appropriate treatment of deferred taxes. Correia et al. (2019) maintain that the appropriate treatment of deferred tax is an issue that arises from the debt-to-equity ratio. IAS 12 is the international accounting standard that regulates the proposed treatment of deferred taxes purely from a financial accounting perspective. The classification of deferred taxes in ratio analysis lies in the hands of the analyst (Correia et al., 2019; Lasman & Weil, 1978). Given the subjectivity in terms of the treatment in ratios a need arises to analyse the inputs used in the ratios to determine the appropriate treatment to achieve consistent and accurate information.

There are two main sources of financing available to a company, namely debt, and equity. Both these sources differ and have well-known characteristics (Bartlett et al., 2014). The debt-to-equity ratio serves the purpose of displaying the proportion of debt financing used by the company compared to equity funds invested (Madan, 2007; Palepu et al., 2020). The debt-to-equity ratio is one of the key ratios in terms of risk and debt management for an entity. According to Correia et al. (2019) the debt-to-equity ratio indicates to what extent shareholders' funds cover debt and is an indication of medium financial risk. The debt-to-equity ratio is commonly used to measure financial leverage and is also useful for credit analysis (Penman & Penman, 2010). The debt-to-equity ratio can therefore be used to determine a company's debt position, especially from the perspective of future investors and creditors. The lower this ratio, the better a company's debt position is in terms of long-term debt-paying ability (Gibson, 2013; Robinson, 2020).

Debt-to-equity is one of the most commonly used debt management ratios (Bartlett et al., 2014). The debt-to-equity ratio provides crucial information to creditors, analysts, shareholders, and potential investors regarding the strength or weakness of a company, for example, long-term survival and the probability of future dividend payments (Muti'ah & Ahmad, 2021; Axson, 2010). The debt-to-equity ratio can be used to calculate the share price of an entity with greater precision (Safania et al., 2011; Simanullang & Simanullang, 2022) and has an impact on the share price of a company (Simanullang & Simanullang, 2022). The importance of the debt-to-equity ratio and the role it plays in financial statement analysis can't be understated, this emphasises the importance of the correct calculation of this formula. The appropriate treatment of deferred tax is one of the subjective items in the calculation of this ratio. Correia et al. (2019) maintain that the appropriate treatment of deferred tax is an issue that arises from the debt-to-equity ratio.

The question could therefore be asked: what is the appropriate treatment of deferred tax when calculating the debt-to-equity ratio? The inclusion or exclusion of this amount can have a significant influence on the debt-to-equity ratio, which is viewed as one of the key risk formulas for any entity.

The research objective of this study is to gain a better understanding of the treatment of deferred tax in the debt-to-equity ratio and to determine how this differs in theory and practice. Different opinions of theorists were analysed and compared. This was done to gain better insight regarding the inner workings of the debt-to-equity ratio and to identify to what extent the literature agrees or disagrees regarding certain aspects of this ratio. Interviews will be performed, and the results obtained from professionals in practice and academia will be compared and analysed to determine whether any differences or similarities exist in the participants' treatment of deferred taxes. and based on this information a comparison between theory and practice will be made.

This study makes an empirical contribution through the research conducted which indicated that there are a multitude of ways that a ratio can be calculated and understanding the purpose of the ratio and how the different inputs affect the calculation is the key to successfully analysing the information disclosed in financial statements. The research can be used as a starting point by financial statement users to investigate the effect that deferred tax can have on other ratios based on the figures reported in the financial statements. This will facilitate discussion regarding ratios and show that the items included in calculations are not set in stone and have a variety of implications.

2 Literature Review

The literature study will follow a two-pronged approach. Firstly, the work of theorists regarding this specific ratio will be carefully reviewed and considered. Consideration will also be given to locally (nationally) and internationally published academic research on this matter. This will be performed to gain a thorough understanding of the current and proposed treatment of deferred tax in the debt-to-equity ratio. Different opinions of theorists will be analysed and compared. This will be done to gain a better insight regarding the inner workings of the debt-to-equity ratio and to identify to what extent the literature agrees or disagrees regarding certain aspects of this ratio.

To fully understand the theory behind ratio analysis, the importance of financial statements must first be understood. A better understanding of the role of financial statements enhances the understanding of the importance thereof. The economic consequences of the business activities of a firm are summarised in its financial statements (Palepu et al., 2020). Penman and Penman (2010) maintains that the primary source of information regarding a firm is the financial statements they publish. According to Singla (2014) some of the most valuable information of past performance and present position of an entity are stored in financial statements.

Potential equity, debt, and credit suppliers, as well as company management, can dramatically reduce their cost of searching for financial information by using a company's general purpose financial statements (Colson, 2005). Financial statements portray the role of supporting external users in evaluating the current and projected performance of the company and are one of the least expensive and most widespread methods of communication management (Dobrin, 2010).

2.1 Financial Statement Analysis

The standard analysis of financial statements distinguishes shareholders' probability from the risks that arise from operations that emerge from the companies' borrowings to finance operations (Nissim & Penman, 2003). This analytical process aims to establish trends for the enterprise over a certain period and to compare the results and trends with those of competitors to identify appropriate measures to improve current strengths and weaknesses (Skae, 2018).

Financial statement analysis is an incremental and critical tool that is useful for gauging prospects of the real economy that is of interest to academics and practitioners (Konchitchki & Patatoukas, 2014). Gibson (2013) maintains that financial statement analysis is a process of judgement and that one of the primary objectives is the identification of considerable changes in amounts, trends, relationships, and investigating the reasons underlying the changes in the aforementioned. The analysis of financial statements can be achieved through a variety of tools designed to meet specific needs (Subramanyam, 2014).

Analysts use ratios to make projections about the future; this means that it is important that the analyst should understand the factors that could affect such ratios in the future and how past events can affect the ratio (Correia et al., 2019). Analysis corrects where accounting measurement is defective and the analyst supplements the financial statements with other information when the picture is not complete, but to do this the analyst must know what the statements are truly saying (Penman & Penman, 2010). The analyst plays an important role in enabling outside parties to evaluate the firm's current and prospective performance (Palepu et al., 2020).

The financial analyst can be viewed as a critic in terms of a dramatic context and portrays the role of a silent messenger between the stage and audience that assesses the quality of the plot (financial statements) and the performance of the main actors (management) (Bildstein-Hagberg, 2003). The financial analyst forces the market to act and becomes an active creator of trade, by upsetting the structure that separates the reckonable and controllable from the unknown and ambiguous (Bildstein-Hagberg, 2003).

2.2 Ratio Analysis

A multitude of figures is presented in a company's financial statements. These figures do not mean a great deal to the user in isolation; hence it needs to be compared with something else. This is where ratio analysis can be used (Bartlett et al., 2014; Welc, 2022). Ratio analysis is when different account balance relationships are compared (Gibson, 2013; Robinson, 2020). Ratios simply express the mathematical relationship between one variable and another and allow the user to analyse the financial information on which the ratio is based (Bartlett et al., 2014; Damjibhai, 2016; Welc, 2022). The computation of these ratios might be a simple arithmetic process, but the true challenge lies in the interpretation of the ratio which can be more complex (Subramanyam, 2014). Ratios are used to interpret statements to determine where an entity's strengths and weaknesses lie as well as to determine current financial conditions and historic performance (Damjibhai, 2016).

Financial ratios can be used to help equity investors and creditors make intelligent investment and credit decisions through the comparison of the risk and return of different firms (Welc, 2022; White et al., 2003). Ratio analysis is seen as one of the principal tools of financial analysis and includes an assessment of how various line items in the company's financial statements relate to each other (Palepu et al., 2020). Financial statements can be standardised across firms and over time using ratio analysis, facilitating comparative analysis (Welc, 2022; White et al., 2003).

Different analysts stress different attributes regarding the same ratio, meaning that ratios are diverse and have a multitude of application possibilities in more than one specific ratio analysis category (Duhovnik, 2008). Researchers and practitioners find that ratios that express relationships between various items from the three financial statements, serve as effective indicators of various dimensions of probability and risk (Stickney et al., 2007). Ratios calculated from financial information have long been considered accurate predictors of business failure and have proven to make an accurate distinction between failed and non-failed companies several years before failure (Maricica & Georgeta, 2012).

The ratio itself is important, but the financial analyst draws more value from the relationship between the variables used to calculate the ratio and how these variables change over time and compare to suitable benchmarks (Bartlett et al., 2014). Ratio analysis helps the user to understand the firm's liquidity and provide valuable insight into the financial future of the company. Through the use of this technique, appropriate action can be taken to improve the firm's liquidity (Klumpp & Cole, 2014).

The interpretation and studying of how a ratio changes over time and the comparison of a company's specific ratio with suitable benchmarks that enables the analyst to draw certain comparisons and conclusions is one of the instrumental goals of ratio analysis (Bartlett et al., 2014). Ratio analysis also serves as a prediction tool that can be used to prevent financial distress and fraudulent financial reporting (Arshad et al., 2015). Like most other techniques in financial analysis, a ratio is not relevant in isolation. Ratios are useful when interpreted in comparison with prior ratios, predetermined standards, and the ratios of competitors (Subramanyam, 2014; Bartlett et al., 2014).

The most challenging aspects of ratio analysis lie in the skillful application and interpretation of the ratios, and therein lies the success of this analysis technique (Subramanyam, 2014). Financial managers often encounter one specific challenge created by ratio analysis, namely the inconsistency in the utilisation of ratios in different texts and how they are used by different entities (Skae, 2018). The lack of benchmarks that indicate optimal levels is often a problem when it comes to ratio analysis and the evaluation of a ratio often depends on the view and skill of the analyst (White et al., 2003).

There is no standard definition of ratios; however, there is a certain consensus about the importance and significance of certain ratios, but no agreement on how the ratios should be calculated (Duhovnik, 2008). Gibson (2013) states that different computations of the same ratio can be derived from each author or source on financial analysis. A standard list of ratios or standard calculations of these ratios does not exist. Each financial analysis author and source makes use of a different list of ratios and even different calculations. This is one of the challenges of ratio analysis (Gibson, 2013; Robinson, 2020).

2.3 Debt-to-Equity Ratio

There are two main sources of financing available to a company, namely debt and equity. Both these sources differ and have well-known characteristics (Bartlett et al., 2014). Debt forms part of a company's liabilities which represents an obligation to make payments of cash, goods, or service at an amount that is determinable on a reasonably predictable future date as compensation for benefits or services received in the past (Stickney et al., 2007). Shareholder equity refers to the amount that remains after a company's liabilities have been deducted from its assets. It is referred to as residual interest because these shareholders are exposed to the maximum amount of risk associated with the company. This entitles them to the residual interest (Gibson, 2013; Robinson, 2020; Subramanyam, 2014).

Debt management and financial leverage play an important role in financial management and have several implications. By using certain ratios, the analyst will attempt to assess the impact of financial leverage on risk (Correia et al., 2019). Leverage is when relatively more debt financing is used in the capital structure. Leverage aims to increase the returns on equity investors' funds in exchange for the acceptance of higher financial risk (Correia et al., 2019).

Debt-to-equity is one of the most commonly used debt management ratios (Bartlett et al., 2014). Debt management ratios are also known as solvency ratios (Bartlett et al., 2014). Debt management ratios are used to determine the company's adherence to its stated financing policies, its target capital structures, and agreed-upon debt-to-equity proportions (Bartlett et al., 2014). The analysis of a firm's capital structure is essential and plays a pivotal role in evaluating long-term risk and return prospects, indicating the important role debt plays as well as the risk that comes with it (White et al., 2003). Debt management ratios attract the interest of certain stakeholders, such as banks and credit providers, because these ratios provide some indication of the prospects and current financial well-being of the company (Bartlett et al., 2014).

The debt-to-equity ratio serves the purpose of displaying the proportion of debt financing used by the company compared to equity funds invested (Colline, 2022; Madan, 2007 Palepu et al., 2020). The debt-to-equity ratio provides crucial and important information to creditors, analysts, shareholders, and potential investors regarding the financial strength or weakness of a company, for example, the probability of long-term survival and the expectation of future dividend payments taking place (Axson, 2010).

The numerator comprises both secured and unsecured loans, and the denominator consists of ordinary, and preference share capital, reserves, and surpluses (Colline, 2022; Madan, 2007). The numerator of the debt-to-equity ratio will be debt. The debt used in the calculation of this ratio can include all liabilities; all liabilities excluding current liabilities or only long-term interest-bearing debt can be used, and debt held on behalf of other companies and the government will be excluded from debt (Colline, 2022; Lasman & Weil, 1978).

Many borrowings may include a covenant that protects the issuer (Subramanyam, 2014). One of these covenants can include the maintenance of a constant debt-to-equity ratio, and if this covenant is not upheld it could lead to the immediate repayment of the outstanding amount (Subramanyam, 2014). The long-term debt-to-equity ratio can be used to calculate the share price of an entity and helps to ensure that the calculation is done with greater precision (Safania et al., 2011). The debt-to-equity ratio is the most commonly used ratio worldwide when it comes to measuring financial risk. The higher the ratio, the higher the financial risk of the company, since a higher ratio implies higher interest charges and increased exposure to possible interest changes (Bartlett et al., 2014).

2.4 Background to Deferred Tax and Income Taxes (IAS 12)

Deferred tax is regarded as an obligation or asset that the company will recover or pay at a future date due to differences between information reported in terms of international financial reporting standards and the income tax act (Koppeschaar et al., 2016).

Deferred tax liability is defined as the amount of income tax that will be payable in future periods in respect of a taxable temporary difference, and a deferred tax asset is the amount of income tax that will be recovered in a future period (Görlitz & Dobler, 2021; Koppeschaar et al., 2016). Deferred tax assets (liabilities) provide progressive information regarding future tax benefits (payments) that will be realised upon reversal of the account. The benefits (payments) associated with deferred tax assets (liabilities) are substantial items for many firms (Laux, 2013).

Deferred taxes can be found in the Statement of Financial Position and is the estimated amount in need for the upcoming period that exists as a result of temporary differences between financial accounting standards and tax regulations (Ifada & Wulandari, 2015). Deferred tax is viewed as an obligation or asset that will be payable or recoverable at a date in the future (Görlitz & Dobler, 2021; Koppeschaar et al., 2016). Deferred tax and income tax amounts influence the assessment of a firm's financial position such as the current ratio and debt ratios (Stickney et al., 2007). A deferred tax asset (liability) provides forward-looking information about future tax benefits (payments) that are a result of the deferred tax account reversing in the future (Laux, 2013).

Laux (2013) indicates that, based on findings, investors seem to value only the information content of certain items of deferred tax; Laux, therefore, questions the information's ability to offset the cost of delivering and utilising it. One way to view the deferred tax balance is to see it as an interest-free loan that the government provides to the firm and that needs to be repaid in the future; therefore, the item is a liability. By using this framework, the presence of deferred taxes effectively increases the financial gearing and consequently creates ordinary share systematic risk (Chandra & Ro, 1997).

2.5 Treatment of Deferred Tax in the Debt-to-Equity Ratio

A problem area of ratio analysis is the lack of uniformity in the way certain ratios are calculated. This becomes especially pertinent when the debt-to-equity ratio is calculated. To make comparison possible the debt-to-equity ratio of the firm should be calculated similarly to industry ratios (Gibson, 2013; Robinson, 2020). Correia et al. (2019) state that the appropriate treatment of deferred tax is an issue that arises from the calculation of the debt-to-equity ratio. Given the history of the diversity of accounting policies regarding deferred taxes as well as the variety of different prevailing views on the nature and cash flow implications, it becomes important to determine and understand how the market perceives deferred taxes (Chandra & Ro, 1997).

The following proposed treatments of deferred tax in the calculation of the debt-to-equity ratio is provided by Huss and Zhao (1991):

- Liability treatment: The deferred income tax credit will be included as part of the company's long-term liabilities.
- Equity treatment: The deferred income tax credit is added to shareholder equity; or
- Excluded from the ratio: The deferred income tax credit will not be used in the calculation of the debt-to-equity ratio.
- Asset reduction treatment: The firm's assets are reduced by the deferred income tax credit.

2.5.1 Deferred Tax: Liability Treatment

The reason for treating deferred tax as a liability is based on the assumption that the tax will be paid and redeemed in the near future by the person who bears the tax responsibility (Huss & Zhao, 1991). Many analysts are of the opinion that the net worth of the firm is understated by the amount of the deferred tax liability since this item will likely never become due and it is therefore not a liability at all (Fridson & Alvarez, 2022).

The deferred income tax line item reported on the Statement of Financial Position does not have all the attributes of a liability, as there is a lack of legal obligation as well as relative certainty of the amount and relative certainty of the date the obligation will be settled. Moreover, unlike a true long-term liability, the amount displayed in the statement is not a present value calculated using a historical market interest rate. All these factors add to the item not being a true liability (Lasman & Weil, 1978).

When an assessment of ordinary share risk is done, the market regards deferred taxes not as a tax burden, but as an indicator of favourable future cash flows or perhaps as a permanent transfer of the government's stake in the overall value of the firm to shareholders. The market rewards firms' efforts to defer or minimise taxes by viewing such firms as lower-risk investments. Many doubts and questions are raised regarding the treatment of deferred taxes as a liability and whether this treatment is an appropriate basis for formulating accounting rules for deferred taxes (Chandra & Ro, 1997).

2.5.2 Deferred Tax: Equity Treatment

In a growing company, the deferred tax will never really reverse, and therefore the deferred tax liability should be added to equity when calculating the debt-to-equity ratio (Bartlett et al., 2014). Jeter and Chaney (1988) concur that the appropriate treatment of deferred taxes lies in the consistent growth of the account and how likely future reversal might be. The reasoning behind deferred tax liability forming part of equity is because, if the company continues to pay taxes at less than the statutory rate, the deferred tax account will continue to grow (Fridson & Alvarez, 2022). Equity treatment is motivated by the fact that increases in deferred taxes are de facto earnings (Huss & Zhao, 1991). The view of recording the deferred tax liability as shareholders' equity will have certain implications, one of which is that this treatment will be negatively related to ordinary share risk (Chandra & Ro, 1997).

The high persistence and strength of the observable negative correlation between deferred tax and risk is an indication that the market does not regard deferred taxes as a liability but might instead view it as a form of equity. Deferred taxes are not redeemable as long as the firm is experiencing increasing amounts of originating temporary differences each year (Chandra & Ro, 1997).

Tax benefits included in the cost of an asset lead to classical accounting relations being preserved by expensing only a portion of the deferred tax expense. If the deferred tax liability is not expensed against the price of the asset, and the benefits are not reflected in the price of the operating assets, proper accounting determines and requires the deferred taxes to be valued as equity, increasing the value of the firm (Amir et al., 2001). Deferred taxes become repayable and in effect reverse temporary differences when the reported temporary differences exceed the originating differences during the year when such a firm reduces the size of its depreciable assets while earning increased taxable income, which is rare. Thus, the view of the market might be that deferred taxes is a permanent tax saving or a transfer of the government's share of firm value to shareholders, thereby increasing shareholder equity (Chandra & Ro, 1997).

2.5.3 Deferred Tax: Excluded from the Debt-to-Equity Ratio

The financial analyst must determine whether the deferred tax will be included or excluded when the debt-to-equity ratio is calculated (Lasman & Weil, 1978). The treatment of deferred taxes can lead to information being reported in a manner that does not reflect the economic substance of the item. When anticipating that the total amount of deferred taxes will not reverse in the future, the reported liability will be higher than the economic substance of the event (Jeter & Chaney, 1988).

Amir et al. (2001) state that, through analysis performed, the results show that the deferred tax liability, as currently recorded in accordance with financial accounting standards, overstates the firm's liabilities. According to Chandra and Ro (1997) when the debt-to-equity ratio is being calculated and an adjustment is made for deferred taxes as a liability, the deferred taxes account will relate negatively to the market beta and the standard deviation of ordinary share returns. This negative relation will persist when the accounting beta, financial gearing, and the variability of operating returns are controlled, and this negative relation will be prevalent over subsamples of firms where the selected characteristics differ. Huss & Zhao (1991) posit that one of the ways to calculate the debt-to-equity ratio is to completely exclude deferred tax from the calculation to minimise the influence of this item.

2.5.4 Deferred Tax: Asset Reduction Treatment

Relative to current standards, when deferred taxes are accounted for in terms of international accounting standards, it leads to the liability being overstated. The overstatement should be accounted for as equity. Further, the effect of this overstatement will depend on whether the tax benefits are capitalised into the original cost of the asset that led to the deferred tax liability being recognised. If so, the tax liability should be reduced to net present value; if not, the entire balance should be reported as equity (Amir et al., 2001).

Tax deductibility and the taxability regarding the deferred tax liability is something that can be taken into account when the value of an asset is being determined (Huss & Zhao, 1991). Huss and Zhao (1991) maintain that asset reduction treatment is one of the ways in which deferred tax can be treated when calculating the debt-to-equity ratio. This proposed treatment suggests that the deferred tax liability should be treated as a reduction in the value of the firm's assets.

2.6 Summary

The research shows that deferred tax can either be included as a liability; excluded from liabilities; included as part of equity; or be partially offset against the price of the asset. Each one of these proposed treatments will have a different outcome when calculating the debt-to-equity ratio and this ratio can considerably be affected by the different treatments, which can lead to different decisions being made based on a ratio that can be affected by one substantial item.

3 Methodology

The constructivism paradigm was adopted during the study, as subjective meaning based on interpretation was developed to answer the research questions in the best possible manner. Social constructivists adhere to the belief that individuals seek understanding of the world in which they live and function. This understanding is gained by developing subjective meaning from their own life experiences (Creswell & Creswell, 2017). The frame (world) in which the study is performed is the world of science and scientific research. An aspect (deferred taxes) is taken from the world of business (the calculation of the debt-to-equity ratio) and searched to find truthful knowledge thereon (what is the proposed treatment of deferred taxes in the calculation of the debt-to-equity ratio?). The study is classified as empirical, collecting primary numeric and textual data (a combination thereof), with a low level of control.

The research uses an exploratory research design given the absence of detailed prior research (O'Dwyer et al., 2011; Sundin et al., 2010). A qualitative approach is necessary as it offers deeper insights than those which would have been obtainable using a quantitative approach (Holland & Doran, 1998; O'Dwyer et al., 2011). The qualitative approach was utilised in this study, as more focus is placed on words and correspondence than on numbers which represent concepts and opinions. The qualitative study consisted of a research interview conducted with participants which include academic practitioners and professionals in practice. The type of data gathered and used in this study is textual data, as the responses of the interview questions regarding descriptive questions are interpreted as textual results.

This method is designed to provide insights into the calculation of the debt-to-equity ratio. The research consisted of an inductive thematic exercise inspired by grounded theory (Leedy & Ormrod, 2015). The researcher made use of dialogue, which is important due to its ability to extract detail (Rowley, 2012). Accordingly, this research contributes to the understanding of the treatment of deferred tax in the debt-to-equity ratio. The use of dialogue further, ensured validity (Leedy & Ormrod, 2015).

3.1 Data Collection

Semi-structured interviews were used to collect data. The interview questions were open-ended which ensured that participants were able to interpret the topic freely and the researcher could gauge their stance (Holland, 2005). This was advantageous, as participants were encouraged to talk widely around the topic, without the restriction of a "correct" or "incorrect" answer (Holland & Doran, 1998).

Participants were purposively selected, based on their knowledge of and experience with the calculation of the debt-to-equity ratio. Although this purposeful selection could have introduced bias (Creswell & Poth, 2016; Solomon & Maroun, 2012), it was inappropriate to rely on non-technical perspectives to determine the treatment of deferred tax given the exploratory nature of this research (Creswell & Poth, 2016). This selection, through the reliance on informed and experienced professional judgement, ensured that a large basis of uniform responses was received (Creswell & Creswell, 2017).

Detailed interviews Semi-structured interviews were conducted, giving respondents the freedom to interpret questions and express themselves. If necessary, follow-up questions were asked. An interview agenda which covered general questions regarding the treatment of deferred tax in the debt-to-equity ratio was used. The use of an interview agenda ensured that the study remained exploratory and intentionally unobtrusive within the wider study of ratio analysis. Interviews were carried out individually to ensure that participants did not influence one another (Rowley, 2012). Before the commencement of the interview, the interview agenda was made available to the participants to ensure that participants were informed and could provide a sufficient response (adapted from O'Dwyer et al., 2011). Interview questions were derived from prior literature regarding treatment of deferred tax in the debt-to-equity ratio (Correia et al., 2019; Chandra & Ro, 1997; Fridson & Alvarez, 2022; Huss & Zhao, 1991; Lasman & Weil, 1978).

Ten academic practitioners were selected of which five specialise in accounting and five in financial management, which represent a fair reflection of both sides of the theory. Accounting academics was specifically chosen because of their focused knowledge of deferred taxes and to gain insight into the treatment of the item in terms of IAS 12, a specific accounting term based on International Financial Reporting Standards. Financial management academics were chosen because of their focused knowledge regarding financial statement analysis, specifically the calculation of the debt-to-equity ratio, to gather data regarding what the proposed treatment of deferred taxes is when calculating this ratio. The professionals in practice chosen consist of stockbrokers and portfolio managers who focus on investing and selling shares in firms. The reason for the selection is that these professionals calculate specific ratios based on a company's statements and use these ratios in their decision-making process. The sample of ten participants consists of traders, fund managers, quantitative-, and equity analysts.

A total of 20 interviews were performed ranging between 45 and 90 min. They were digitally recorded. The duration and number of interviews were informed by the need to achieve "conceptual saturation". The researcher relied on a relatively small sample size of participants because of the exploratory nature of this study (Leedy & Ormrod, 2015; Ryan, 2002). It is important to note that the purpose of qualitative research is to explore a problem, offer deeper insight, and not generalise information (Creswell & Creswell, 2017; Leedy & Ormrod, 2015). Small sample sizes are an inherent characteristic of qualitative research (Rowley, 2012).

Trustworthiness was illustrated by recording, transcribing, and coding the interviews conducted. The results of these interviews were interpreted, and the results obtained from professionals in practice were compared and analysed to determine whether any differences or similarities exist in the participants' treatment of deferred taxes. The results of interviews with academics were also interpreted to determine what the specific views are from an academic perspective and based on this information comparison between theory and practice was made. The results of the interviews and the literature study were used to draw a conclusion regarding deferred taxes and the debt-to-equity ratio.

3.2 Data Analysis

The processes of analysing and interpreting data were iterative and involved a grounded theory approach. The purpose of this was to identify themes from the analysis and re-analysis of transcripts and summary notes. After each interview, a discussion between the researcher and supervisor occurred. The purpose of this discussion was to reflect on the interview and ensure that all complications were probed before subsequent interviews took place. This discussion was recorded. The researcher then reanalysed the interview recordings and took note of any important points, as well as any practical details. These notes were then compared to the discussions between the supervisor and researcher. The purpose of this was to ensure consistency, with any discrepancies being followed upon. Each interview was then transcribed, and initial summary notes made.

After transcripts and summary notes were analysed, key themes, as well as similarities and differences, were identified and aggregated. The researcher then grouped similar comments under open codes. Data points were then compared to the initial discussion between the supervisor and researcher to ensure validity and consistency. The transcribed interviews were then made available to the participants for review. As each interview was completed, transcribed and analysed, it was coded, with consideration made for the main points identified in the recordings, and the research questions (Leedy & Ormrod, 2015; Rowley, 2012).

During the coding process, the researcher remained aware of new codes that affected previous interviews. At the identification of a new theme, the researcher re-coded previous transcripts. This process continued until a sufficient level of conceptual saturation and familiarity was achieved (Creswell & Creswell, 2017; Holland & Doran, 1998). On the achievement of saturation, the open codes were then re-examined and grouped under different axial codes.

Interpretive studies are inherently subjective as the researcher is integrally involved in collecting data. Nonetheless, the selected research method does not threaten the validity and reliability of the data collected (Creswell & Creswell, 2017). The researcher further reduced bias by subjecting all open and axial codes collected to a peer review (Creswell & Poth, 2016). Additionally, prior research was used to inform the interview agenda, as well as the selection of open and axial codes (Creswell & Creswell, 2017).

4 Findings and Analysis

From the data gathered three main themes could be identified under which the research interviews could be classified. The main themes identified include the following:

- Factors other than deferred tax are taken into consideration when calculating the debt-to-equity ratio.
- Current treatment of deferred tax as a liability in this ratio and the impact thereof; and
- The different proposed treatments of deferred tax in the calculation of the debt-to-equity ratio.

The main themes were then split into sub-themes to help better sort and categorise the responses made by participants.

The information below provides a summary of the views of participants in academia and practice and indicate what the key takeaway points are from data collected in relation to the sub-themes identified.

4.1 Factors Other than Deferred Tax Taken into Consideration When Calculating the Debt-to-Equity Ratio (Theme 1)

The first theme emerging from the interviews regards factors other than deferred tax which can be taken into consideration regarding the debt-to-equity ratio. It consists of three sub-themes, namely:

- What value can be placed on the calculation of the debt-to-equity ratio and the information that can be extracted from this ratio? (sub-theme 1)
- Should information reported in terms of International Finance Reporting Standards (IFRS) be adjusted when calculating certain ratios?
- Will the type of analyst influence the inputs used to calculate the debt-to-equity ratio?

Sub-theme 1 responses: The debt-to-equity ratio provides crucial information regarding the company to a wide variety of stakeholders. A debt-to-equity ratio is a tool that delivers particularly valuable information regarding long-term survival, financial risk, and the level of debt financing being used by a company. The debt-to-equity ratio would have more meaning and be more valuable if this ratio is investigated and used for external purposes compared to looking at the ratio internally.

The responses from participants correlate with the findings of Axson (2010) who find that the debt-to-equity ratio provides crucial and valuable information regarding the company to a wide variety of stakeholders. It could also be determined that the ratio delivers valuable information regarding some key areas, for example financial risk, solvency, leverage, and share price, and is a ratio that summarises the entire Statement of Financial Position. This correlates with the findings of Bartlett et al. (2014), Axson (2010), and Palepu et al. (2020) who propose that the debt-to-equity ratio is a tool that delivers very important information regarding long-term survival, financial risk, and the level of debt financing being used by a company.

Most of the participants in practice opine that the ratio is not the most important ratio to calculate or use and that the ratio is likely used more often as a check ratio. The true importance of this ratio actually comes through when the ratio is quite sizeable, which could then be a flag for further investigation. Gibson (2013) makes a similar finding regarding ratio analysis, viz. that some ratios have stronger importance compared to other ratios, and that a certain ratio might have a higher preference in one industry compared to another.

Sub-theme 2 responses: The participants in the field of accounting note that information reported in terms of IFRS already considers what management requires to make decisions and that there is no requirement to adjust these figures. The professionals in practice state that, if the information could be standardised across companies, it would allow them to cover more ground over a shorter period, a sentiment echoed in the literature. However, given the above, many of the participants in practice and academia support the statement that IFRS figures should be adjusted to increase and improve comparability. If adjustments are correctly applied, it makes the information more understandable and accurate. However, adjustments regarding figures reported in terms of IFRS should not be overemphasised as much time is devoted to the development of reporting standards to ensure that accurate management decisions can be made.

The responses from participants agree with the statement made by Skae (2018) that too many adjustments to financial information could open the door for manipulation, which poses a problem when accurate conclusions need to be made. A large number of the participants support the statement that IFRS figures should be adjusted to increase and improve comparability. Skae (2018) agrees that different accounting policies applied by companies can cause limitations in terms of comparability and that, by adjusting certain information, this limitation can be addressed.

Sub-theme 3 responses: The overwhelming response from academia and practice regarding this question is that the analyst and their background will in some way influence the inputs used to calculate a ratio. Each analyst has their own goals when they calculate and look at different ratios, which affects the way a ratio is calculated. Analysts also employ individual methods and techniques to calculate a certain ratio to ensure the correct information can be extracted from the ratio. The focus must be placed on the analyst who calculates and discloses a certain ratio because the background of the analyst and their views will affect how inputs like deferred taxes are treated in the calculation.

These responses correlate with previous research and results delivered from others. For example, the fact that there are no specific benchmarks to indicate optimal levels is often a problem that can be encountered with ratio analysis, and the evaluation and calculation of a ratio often depends on the views of the analyst

(White et al., 2003). The participants' responses show a relationship with Gibson's (2013) findings that there is no standard calculation for ratios, and that each analyst and source on financial analysis makes use of different calculations to calculate certain ratios.

4.2 *Current Treatment of Deferred Tax as a Liability in the Debt-to-Equity Ratio and the Impact Thereof (Theme 2)*

The second theme regards how deferred tax as a liability should be treated in the debt-to-equity ratio and what the impact of this is. Four sub-themes were identified, namely:

- The role the industry plays in the treatment of deferred tax in the debt-to-equity ratio.
- Can a deferred tax liability be regarded as a form of debt financing?
- Will the inclusion or exclusion of deferred tax from debt influence decisions made based on the calculation of the debt-to-equity ratio? and
- Is a deferred tax liability an influential item in the calculation of the debt-to-equity ratio?

Sub-theme 1 responses: The participants who primarily focus on financial accounting state that the type of industry in which an entity operates would not have an impact on the deferred tax liability and its treatment in the debt-to-equity ratio. This is because every single company must pay taxes regardless of their industry. If the deferred tax liability is treated differently between industries, comparability would be directly affected and be less effective. More than half of the participants responded that they believe this type of industry would affect the treatment of deferred taxes. The responses are substantiated by providing examples from two different industries, like banking and mining, and explaining why differences between these two industries exist.

The information used to calculate ratios across industries could be standardised as far as possible—if all the debt-to-equity ratios in one industry include deferred taxes while another industry excludes it from the ratio, comparability will be heavily affected which could lead to incorrect decisions being made. Participants provided a possible solution, viz. to rather disclose the ratio including and excluding deferred taxes so that the user thereof can see both ratios and use the one that best suits their needs and through this, the impact of a specific industry can be better managed.

Sub-theme 2 responses: Most of the participants from academia and practice are of the opinion that deferred tax liability cannot be a form of financing as it can become repayable at any moment. The fact of the matter is that it is ultimately a postponement of payment rather than financing provided by the nation's tax collecting authority regarding an amount of tax that will become repayable in a future period. When comparing a deferred tax liability with, for example, a bank loan, it clearly shows that deferred taxes do not consist of the same debt format as a loan as it is an obligation to pay taxes. When calculating the debt-to-equity ratio it should be properly disclosed that the deferred tax liability is not a form of debt financing and that this item should not be taken into consideration when looking at the company's long-term capital structure.

The responses of the deferred tax liability not being a form of debt financing corresponds with those of Koppeschaar et al. (2016), namely that a deferred tax liability can be viewed as a future tax obligation and the repayment of income tax in a future period is the result that will occur upon realisation of this liability.

Sub-theme 3 responses: All the participants, from both academia and practice, agree that the inclusion or exclusion of deferred tax from the debt-to-equity ratio would affect decisions made based on this ratio, but that the effect thereof would not always be material. According to the participants, there are instances where the exclusion of the deferred tax liability can have an extremely material effect, especially if the liability is exceptionally large in proportion to the company's other debt. The type of decisions that the debt-to-equity ratio is used for would also be affected by how substantial the treatment of deferred tax is when calculating this ratio.

The solution regarding the problem of decisions being affected by the inclusion or exclusion of deferred tax is either to reduce the risk by always including the deferred tax liability in the calculation of the ratio or to disclose the ratio including and excluding deferred tax so that the user could see what impact the deferred tax liability has on the debt-to-equity ratio.

Sub-theme 4 responses: four professionals in practice and four professionals in academia view the deferred tax liability as an influential item; the level of influence, however, is directly related to the size of the liability. The reason for the item being influential is that the item will have an impact on the management decision-making process, and with most companies, the deferred tax liability can be quite sizeable and due to this, it will have a material impact on decisions made by management.

Six professionals in practice and four professionals in academia note that the deferred tax liability would not be an influential item as it is not an item that receives a large amount of focus when it comes to calculating ratios. Decisions might be affected in some way, but the effect of how the deferred tax liability is treated might not be that material. The solutions that can be implemented are to calculate the debt-to-equity ratio including, excluding deferred taxes, and to disclose both ratios. This will reduce the risk of the item materially affecting decisions as both alternatives of the ratio can be viewed.

The responses from participants correlate with Chandra and Ro's (1997) findings that the debt-to-equity ratio can be calculated in a variety of ways, and that when this ratio is adjusted for deferred taxes this change will then be negatively related to the company's ordinary share risk. Financial risk measures and decisions based on these measures could be affected in a negative manner. Participants posit that, if the deferred tax liability is small in relation to other debt and equity, the inclusion or exclusion of this item will not have a significant impact on decisions made by the company.

4.3 The Different Proposed Treatments of Deferred Tax in the Calculation of the Debt-to-Equity Ratio (Theme 3)

The third theme regards the different proposed treatments of deferred tax in the calculation of the debt-to-equity ratio. It is divided into four sub-themes namely:

- How will the participant treat the deferred tax liability in the calculation of the debt-to-equity ratio?
- Can a deferred tax liability be treated as equity in the calculation of the debt-to-equity ratio?
- Can a deferred tax liability be offset against the cost price of an asset when calculating the debt-to-equity ratio? And
- Would the exclusion of the deferred tax liability deliver a more accurate debt-to-equity ratio?

Sub-theme 1 responses: The overwhelming response to this question from participants in academia and practice move towards treating the deferred tax liability as part of the debt in the calculation of the debt-to-equity ratio. This is because it is still an obligation to repay an amount in the future. Since the users of financial statements and ratios are the same, and because IFRS attempts to take everything into account for decision-making purposes, twelve of the participants, six from academia and six from practice feel that the current treatment of the item as a liability is correct. The participants who state that the item should be included as part of debt agree with the views of Huss and Zhao (1991), that the treatment of deferred tax as a liability assumes that the tax will be paid and redeemed in the near future.

The exclusion of deferred tax from liabilities correlates with Bartlett's et al. (2014) view that in a constantly growing company the deferred tax liability will never really reverse due to assets continuously being replaced. Thus, the deferred tax liability should rather be excluded from debt. The main issue faced by professionals in practice is a lack of time to calculate the debt-to-equity ratio in several separate ways. Based purely on the responses from the interviews it is determined that the deferred tax liability should be included in the calculation of the debt-to-equity ratio as this treatment ensures that the item is considered when the debt-to-equity ratio is calculated.

Sub-theme 2 responses: The fact that the deferred tax liability is an obligation to repay an amount to the nation's tax collecting authority makes it more of a liability than equity, and the fact that the equity holders have no share in this amount can be contradictory towards the decision to recognise it as equity.

Six of the participants from academia state that the deferred tax liability still represents an obligation to pay any outstanding amount and, as such, the item cannot be treated as equity. The equity holders have no claim towards the deferred tax liability as this amount must be paid to the nation's tax collecting authority in the future and the company cannot use these funds put aside as investments in long-term projects as it is still an obligation that can become repayable at any moment.

There is a compelling argument that the deferred tax liability is closer to equity rather than a liability because of its permanence and the fact that it is a long-term source of funding. Six of the ten participants in practice state that they would rather treat the deferred tax liability as equity due to the permanence of the item in a growing company. The responses from participants agree with the research performed regarding this question. The suggestion of participants to treat deferred tax as equity agrees with the findings of Fridson and Alvarez. According to Fridson and Alvarez (2022) the reason why the deferred tax liability should form part of equity rather than debt is based on the fact that, as long as the company continues to pay taxes at less than the statutory rate due to assets continuously being replaced, the account will not reverse. The responses from participants agree with research performed regarding this question.

Sub-theme 3 responses: Six professionals in practice and four in academia posit that one could offset the deferred tax liability against the cost price of the asset that created the temporary differences and that this could be a solution for the whole debt-to-equity dilemma and what should be done with deferred taxes. The problem with this proposed treatment is an "out of sight, out of mind" problem as the company might completely forget about the liability. Furthermore, other ratios could also be negatively impacted by treating the liability like this.

The other half of the participants, consisting of six professionals in academia and four in practice, state that offsetting the deferred tax liability against the cost price of the asset would unnecessarily overcomplicate matters and the treatment of deferred tax like this could have large consequences for other aspects of the company. Treating the liability in this manner will also lead to information being lost as well as information regarding assets being displayed incorrectly, thus negatively impacting the company in the long run.

Sub-theme 4 responses: The majority of the participants state that they would still include the deferred tax liability in the calculation of the debt-to-equity ratio as this item still reflects a future obligation of the entity, and the amount will have to be repaid in a future period. The inclusion of the liability as part of the debt is a better reflection of the debt-to-equity ratio as opposed to completely excluding it from the calculation. It is also proposed that two ratios, one including and the other excluding deferred tax, be calculated.

5 Conclusions and Recommendations

With regards to gaining a better understanding of the purpose and implications of the debt-to-equity ratio, it can be posited through reviewing the literature that this ratio conveys a particularly important message regarding the investment structure and operational activities of the company. The debt-to-equity ratio is one of the most used ratios when it comes to measuring a firm's financial risk. Thus, it could be determined that the debt-to-equity ratio is a crucial ratio that can deliver valuable information regarding the debt management of a company. By examining and comparing the information gathered through the literature study and interviews performed, the conclusion can be drawn that the debt-to-equity ratio is certainly a particularly important ratio from both academic and practice viewpoints. However, the debt-to-equity ratio is not the most important, especially when compared to other ratios that deliver more valuable information.

The viewpoint regarding the debt-to-equity ratio is that the ratio should rather be used as a check ratio. Due to the considerable time constraint imposed on them, professionals in practice do not have time to adjust figures reported in terms of IFRS when calculating certain ratios. The proposed treatment of deferred tax in the calculation of the debt-to-equity ratio is one of the focus areas of this study and determining the separate ways this item could be treated is an area investigated in detail. Based on the literature study and interviews it can be determined that there are many ways of treating deferred tax when it comes to the calculation of the debt-to-equity ratio. Each one of these proposed treatments is supported in some manner by participants in academia and practice. The different treatments of deferred tax have many positive aspects, and some of these alternative treatments help to solve the whole debt-to-equity dilemma regarding the deferred tax liability, but each one of these alternatives can also have negative implications.

As a result of these findings the following recommendations can be made:

- Adjustments regarding figures reported in terms of IFRS should not be overemphasised as much time is devoted to the development of reporting standards to ensure that accurate management decision can be made; thus, making adjustments should not be a focus area when calculating ratios;
- The debt-to-equity ratio should not be calculated and used on its own. The ratio can deliver valuable information, but it is not the only ratio that analysts in practice take into consideration. Using this ratio in combination with, for example, debt-to-EBITDA will increase the value of information extracted;
- Focus must also be placed on the analyst who calculates and discloses a certain ratio because the background of the analyst and their views will affect how inputs like deferred taxes are treated in the calculation. This can have a significant impact on decisions made;
- The information used to calculate ratios across industries could be standardised as far as possible - if all of the debt-to-equity ratios in one industry includes deferred taxes while another industry excludes it from the ratio, comparability will be heavily affected which could lead to incorrect decisions being made;
- When calculating the debt-to-equity ratio it should be properly disclosed that the deferred tax liability is not a form of debt financing and that this item should not be taken into consideration when looking at the company's long-term capital structure;

- The views regarding the treatment of deferred tax in the calculation of the debt-to-equity ratio are similar between academia and practice as the overwhelming responses regarding this item are the same. The main issue faced by professionals in practice is a lack of time to calculate the debt-to-equity ratio in several diverse ways. Based purely on the responses from the interviews and the literature study performed it is recommended that the deferred tax liability should be included in the calculation of the debt-to-equity ratio as this treatment ensures that the item is considered when the debt-to-equity ratio is calculated;
- The deferred tax liability could be treated as equity in the debt-to-equity ratio. It is, however, recommended that disclosure or note should be made indicating that the deferred tax liability forms part of equity. The reason for treating the liability as such should also be stated. The equity holders of the company must also be informed in some way that they have no claim towards the deferred tax liability, and this is still an obligation to pay tax in a future period;
- Financial information should be kept as simple as possible. It is therefore not recommended that the deferred tax liability be offset against the cost price of the asset responsible for the taxable temporary difference. This could complicate matters unnecessarily and could lead to information being lost in the process; and

It is suggested that the debt-to-equity ratio always be calculated in two ways: one ratio should be calculated by including deferred tax in the calculation of the debt-to-equity ratio and another ratio should then be calculated excluding deferred tax from the calculation. By disclosing both ratios the user will be able to see what impact deferred tax has on the calculation of the debt-to-equity ratio, which will reduce the risk of decisions being significantly influenced by the incorrect treatment of deferred taxes. The user can then select the ratio that best suits their needs without completely ignoring the deferred tax liability.

5.1 Areas for Further Research

The study includes only interviews with academics from one of the universities in South Africa as well as portfolio managers and stockbrokers. As a future research opportunity academics from other universities could be included, and professionals from, for example, banks, could be interviewed, as the ratio is often used by banks and considered in terms of debt covenants.

The research only focuses on the treatment of deferred tax in the calculation of the debt-to-equity ratio. Future research could explore other inputs that factor into the calculation of this ratio which can also have a significant impact on the results obtained from this ratio. Other ratios impacted by deferred taxes can also be researched and what impact deferred taxes could have on decisions made based on these ratios. The study primarily focuses on the liability input of the calculation of the debt-to-equity ratio. In furtherance, more focus could be placed on equity and what should be included as part of this item, because equity is an especially critical component in the calculation of the debt-to-equity ratio.

This study focuses solely on the debt-to-equity ratio from a South African company's perspective. Future studies could be performed to investigate how deferred tax could influence a company in other countries across the globe.

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Incremental Machine Learning-Based Approach for Credit Scoring in the Age of Big Data

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Abstract The determination of the financial credibility of a loan applicant by financial institutions is quantified using a credit score. Sources of credit, such as banks and financial institutions, play a crucial role in sustaining economies and keeping cash flowing in the market. Financial institutions solve the problem of lack of data in credit scoring by extracting customer information from data sources such as social networks. Such data sources store data in large quantities. Traditional data mining techniques fail to accurately distinguish between a credit-worthy applicant and a non-creditworthy applicant using big data. The problem of big data has necessitated the advent of machine learning algorithms capable of sifting through large volumes of credit data sourced from social networks. Recently, to automate, streamline and digitise business processes such as credit scoring, machine learning approaches have been widely used, but the design and deployment of effective and robust credit scoring models require a lot of time, and if the behaviour of customers changes or the customer variables drift over time, the credit score model becomes obsolete or outdated. As a result, credit scoring tasks should be considered as an ephemeral scenario due to big data, as variables tend to drift over time. Incremental and adaptive credit scoring models can help to mitigate the loss of time of re-creating credit models due to drifting variables, big data challenges and changes in customer behaviour. This necessitates the design of robust and effective credit score models capable of learning incrementally, adaptive and able to detect changes. This paper proposes the Incremental Adaptive and Heterogeneous ensemble (IAHE) credit scoring model capable of learning incrementally, adapt to drifting variables and detect changes in customer behaviour and learn big data in a streaming fashion. Empirical experiments conducted indicate that IAHE has the strongest ability to recognise default samples and demonstrated the best generalisation ability on the

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datasets and the same time maintained a strong interpretability of the results when compared to nine credit scoring models on four public datasets. The superior generalisation performance of IAHE is statistically significant and demonstrated excellent robustness and adaptation to drifting variables.

Keywords Credit scoring · Machine learning · Ensemble selection · Incremental learning

1 Introduction

In the era of the new digital economy, banks and financial services providers are searching for novel strategies to gain a competitive advantage, remain relevant to customers, find new markets that will drive growth and revenue, and leverage technologies that increase margins and reduce risks. In the digital economy, data-centric services and universal data access will help businesses unlock new revenue streams and reach new markets. Financial institutions struggle to find a balance between maximising revenue when offering a line of credit to an applicant and minimising the propensity of the applicant to default on payment. The basic data about consumers upon which credit scores are built are very conventional such as a person's information on past performance on debt obligations, profiling, main household, income, occupation, demographics, possessions such as cars, properties and census information. Despite a lot of research regarding credit scoring, credit history is not rich enough for the young population, but social data using big data can bring value to the scoring system's performance. In emerging markets, individuals who are underbanked, especially women, the youth and small businesses, cannot access traditional forms of collateral or identifications required by financial institutions such as banks (Biallas & O'Neil, 2020). Due to a lack of data, nowadays, financial institutions collect data about potential clients from sources such as public data, images from satellites, registered from companies and data from social media like SMS and messenger services. This leads to an avalanche of big data that is voluminous, unstructured, steaming and this makes artificial intelligence assist lenders to assess the behaviour of the consumer and subsequently verify the ability of the clients to repay the loans (Biallas & O'Neil, 2020).

Data sourced from social networks involves applicants with limited personal financial history and online social media data does not have good potential in discriminating good credit users from bad ones. In emerging economies, lack of access to financial services is not because creditworthiness does not exist, but merely because banks and financial institutions lack data. The amount of data being generated is exploding exponentially at a remarkable rate due to advents in web technologies and social media. Credit risk assessment can greatly benefit from using non-traditional information with big data. Nevertheless, traditional approaches are struggling when faced with these massive data.

To grant a loan to a potential borrower, financial institutions have to estimate the creditworthiness of the customers accurately in an effort to avoid huge loss given default and the fierce financial competition in the marketplace forces them to correctly distinguish loan applicants into good and bad. A credit score generates a score which is then used to distinguish or categorise loan applicants into creditworthy, that is, able to pay the loan and not creditworthy, that is, unlikely to pay and the scenario is formulated as a classification problem (Crook et al., 2007). As a result, credit scoring plays an important role for financial institutions in their endeavours for credit risk assessment in an effort to alleviate financial losses. Credit scoring is one of the efficient tools in mitigating information asymmetry and managing credit risk (Frame et al., 2001; Tang, 2009). Typically, credit score data comes from disparate sources, is voluminous and often requires preparation and manipulation before teams can begin the data analysis process.

A well-designed credit scoring model is capable of helping financial institutions to decide which loan applications must be approved or not. Efficient and robust credit scoring models have large and economically significant influence on the profitability of financial institutions (Blochlinger & Leippold, 2006). A slight improvement in the generalisation performance of the credit scoring model may yield substantial benefits (Hand, 1997) taking into consideration the enormous business volume in the credit market.

Despite the advent of Artificial Intelligence in the automating and digitisation of credit score models, potential borrowers still feel financially excluded as current credit models are static and fail to adapt to drifting variables and change in customer behavior. To quantify financial credibility, variables such as a customer's information on past performance on debt obligation, profiling, main household, income, occupation, demographics, possessions such as cars, properties that can serve as collateral are used by a credit score to determine a client's creditworthiness. The variables used to assess creditworthiness may drift overtime. With the assumption that the world is stationary or static, the average accuracy of most credit scoring models would remain unchanged, yet this assumption is often not true. Under static or stationary assumptions, it means that in emerging markets, the underbanked customers cannot access traditional forms of collateral or identification that is required by financial institutions for them to be granted loans as the credit score is not adaptive enough to accommodate their status quo. Although many financial institutions are investing a lot in artificial intelligence and machine learning in an effort to reduce human bias and ensure that financially excluded households can obtain credit and also to deal with information asymmetry, adverse selection and moral hazard, the problem of financial exclusion still persists as the less privileged can still not access credit as current scoring models are static and stationary. In addition to that, credit datasets are increasing in volume and often collected over an extended period of time giving rise to changes in the data distribution.

To perform a serious credit risk analysis, assess the behaviour of customers, detect drifting variables and appropriately verify the ability of the customer to repay the loan and allow the less privileged to access credit, this paper handles the design of credit score models as an ephemeral scenario since credit data is voluminous and sourced from disparate sources, many of the variables used to quantify the creditworthiness of a potential customer may drift overtime, therefore data stream mining techniques are used since they are tailored for incremental learning and to detect and adapt to changes in the data distribution (Barddal et al. 2020). This paper proposes a machine learning approach called the Incremental Adaptive Heterogeneous Ensemble (IAHE) credit scoring model which is capable of learning incrementally. Machine learning recalibrates models after their initial design making it easy to adapt to changes in the data.

The rest of the paper is organised as follows: Section 2 provides a review of related work. Section 3 looks at the methodology adopted, and the experiments conducted.

2 Related Work

With so much data available from disparate sources, banks and financial institutions that exploit predictive analytics and machine learning are able to make better decisions in an effort to meet business needs. The rationale behind credit scoring is to create a quantitative model composed of attributes capable of distinguishing two categories of loan applicants, that is, creditworthy applicants and risk applicants, giving rise to a classification problem. Credit risk assessment scenarios are not uncommon with financial institutions and a number of contemporary approaches such as statistical and machine learning have been proposed. Accurately predicting future consumer behavior allows credit risk analysts to better deploy strategies that both capitalise on opportunities and act as preventative measures against disruptive forces to their business models.

To accurately handle class imbalance in credit scoring (Mushava & Murray, 2022) proposed a novel XGBoost extension for credit scoring that uses the quantile function of the generalised extreme value distribution to enhance the detection of rare cases. The proposed approach has no mechanisms to handle big data. To improve the accuracy of credit score models, Adaleta Gicic et al. (2023) proposed the application of deep learning based on stacked unidirectional and bidirectional long short-term memory networks as a complex area to solve credit scoring problems. The approach is computationally intensive and does not address the big data problem. A comparative study of deep learning approach trained from scratch and one that uses transfer learning with a multilingual BERT model was proposed by Lars Ole Hjelkrem et al. (2023). The approach does not consider the challenges of big data.

Statistical approaches have been applied to credit scoring but due to their insufficient accuracy (Gorzalczany & Rudzinski, 2016) and requires some assumptions such as multivariate normality to be assumed which are inconsistent with the real cases (Abellan & Castellano, 2017). For credit scoring tasks and predicting financial trends, machine learning is unparalleled. Machine learning can analyse large datasets, predict future trends and identify forthcoming risks and opportunities that drive better investment decisions. Automating credit score models using machine learning reduces time to credit decisions, improves customer experience with intelligent product selection, customers can check their creditworthiness through smart applications and meet financial regulatory requirements such as interpretability. When compared to statistical approaches, techniques, machine learning based models have demonstrated their superiority in terms of prediction accuracy and dealing with nonlinear pattern classification problems because they do not require a stable distribution assumption (Xiao et al., 2016). Machine learning techniques provide an effective way of dealing with the big data in large, sparse and complex high dimensional samples (Tsiu & Yen, 2014), which makes them very suitable for developing credit scoring models in an incremental online fashion. An ensemble classifier can improve its accuracy if the base learner accuracy is enhanced, the diversity of the base learner has to be optimised and the combination of the prediction output has to be properly done.

To improve the prediction accuracy of a credit score ensemble model, Yufei Xia et al. (2020) proposed a novel tree-based overfitting cautious heterogeneous ensemble model that employs an ensemble selection strategy. To improve robustness, interpretability of results and adhere to the requirements of regulatory authorities in most economies, Zhang Ranchi et al. (2023) suggested a credit scoring ensemble based on logistic regression. Sunghyon Kyeong et al. (2022) introduced a two-stage Logistic regression method based on the Bayesian inference to balance the trade-off between interpretability of results and model performance. Xiaohong Chen et al. (2023) proposed a heterogeneous ensemble model for credit scoring based on the generalised Shapley value and the Choquet integral. To achieve this, the model initially uses the fuzzy measure to express the interactive characteristics between any two coalitions of base learners and a linear programming model for the determination of the fuzzy measure is performed using the accuracy and diversity objective function. Hongliang He et al. (2018) suggested a novel ensemble model for credit scoring to achieve high performance, high robustness and adapt to different imbalance ratio datasets and uses random forests and extreme gradient boosting on base learners. To reduce the adverse impact of noisy data on the performance of ensemble models designed for credit scoring, Yao et al. (2022) introduced a novel ensemble credit scoring model with stacking-based noise detection and weight assignment in an effort to adapt noisy data in raw datasets and to form noise-detected training data to obtain excellent default risk prediction competence.

In most of the research papers suggested in the literature for the creation of credit scores, incremental learning or data stream learning on big data is not cited as a possible approach for the classification problem since variables tend to drift or customer behaviour can change. The proposed approaches in the literature make an assumption that the world is nearly stationary and that the average accuracy of the credit scoring model remains unchanged for an extended period of time which is not true. To fill this gap, this paper proposes the Incremental Adaptive Heterogeneous Ensemble (IAHE) which is capable of learning incrementally both batch and streaming data.

3 Methodology

Combining voluminous disparate datasets with large amounts of data and demographic data to create an accurate credit risk scoring model using traditional approaches is difficult. The application of predictive analytics helps financial organisations better segment product holders and create credit scoring models that can accurately identify new opportunities, offering increased limits while minimising non-payment losses.

This paper proposes an incremental adaptive heterogeneous ensemble as a credit scoring model based on XGBoost and Logistic Regression which are all optimised by the Adaptive Particle Swarm Optimizer. The design of the model consists of sections such as data preprocessing, handling class imbalance, feature selection and model training. Data preprocessing involves the standardisation of datasets and approximation of missing values. The second stage involves feature selection which works based on the score of the feature importance and eliminates redundant features. The model is then built using the selected features and the hyperparameters that are tuned using the Adaptive Particle Swarm Optimizer.

4 What Is Big Data?

Financial institutions are harnessing Artificial Intelligence to revolutionise predictive analytics landscape due to the advent of big data. Traditional predictive analytics approaches are struggling when faced with big data. The volume of data that is generated by current state of the art devices is exploding exponentially leading to big data. Big data is a collection of data that is huge in volume yet growing exponentially with time. It is data with such a large size and complexity that none of traditional data management tools can store it or process it efficiently. Big data provides a challenge for most predictive analytics models for credit scoring. Predictive models have to handle large and complex datasets that are structured, semi-structured or unstructured and will typically not fit into memory to be processed, Big data is differentiated from traditional data by the unprecedented magnitude of volume, velocity and variety. Volume refers to the large amount of data which makes it necessary to process high magnitudes of low-density and unstructured data. Velocity refers to the fast rate at which data is received and lesser so, the speed that data streams must be processed and organised. Variety refers to the diverse sources such as smartphones, media and multiple formats such as text, video, image or audio of data available including the vast majority that is unstructured data. For machine learning tasks, big data implies that more samples are available for learning, and this reduces the risk of overfitting. In addition to the problems of volume, velocity and variety, the process of designing credit scoring models based on big data are also faced with challenges such as time complexity, memory restrictions, class imbalance, concept drift, dirty and noisy data non-linearity and generalisation error. The listed challenges make it difficult for traditional predictive analytics to handle big data, requiring new approaches such as incremental approaches capable of handling challenges poised by big data.

5 Data Preprocessing

The magnitude of features often lead to model overfitting when machine learning algorithms are executed. If the difference between variables of large scale features and small scale features is too large, if features of different orders of magnitude are calculated, this may lead to deviation in training of the model and performance degradation, therefore failing to meet the expected standards. Each variable must have the same measurement standard for the sample before training the model. Data preprocessing is split into two steps: data standardisation, popularly known as the 0–1 scaling and missing values approximation. Standardisation of the dataset in data preprocessing renders the learning model to be more accurate and persuasive especially for classifiers based on distance or edge calculations. The description of the training set is provided as follows: $D = \{X, \mathrm{Y}\}$, where $X = \{x_1, x_2, x_m\}$ representing an m-dimensional eigenspace, $\mathrm{Y} = \{0,1\}$ represents the target, $\mathrm{Y} = 0$ implies a bad applicant and $\mathrm{Y} = 1$ implies a good applicant. Given feature x, the calculation is performed by 0–1 scaling as follows:

$$x' = \frac{x - \min(x)}{\max(x) - minx},$$

where $x^{'}$ is an expression of the standardised value. Credit data is associated with missing values. To approximate missing values, we exploit XGBoost's own sparsity segmentation algorithm which appropriately learns the best way to impute missing values and works well for modeling tasks as opposed to traditional approaches in handling missing values standardisation subdues the influence of outliers indirectly in the event that outliers and noise are prevalent in the data. Extreme values are easily handled by centralisation. The generalisation performance of Logistic Regression is not affected by outliers as it is capable of handling outliers using the sigmoid function.

6 Feature Selection

The calculation of the score of the relative feature importance with the first hyperparameter is performed and the redundant features are eliminated using the feature selection algorithm. The goal of feature selection is to eliminate redundant features, highlight effective features, optimise calculation speed and eliminate the influence of adverse features on the generalisation performance of the learning model.

7 Class Imbalance

Credit datasets are often imbalanced. The number of non-default cases is usually much larger than the default ones. If the class imbalance is ignored, a model with high accuracy for the determination of non-defaulters but extremely low accuracy for defaults is obtained. This study employs the Synthetic Minority Oversampling Technique (SMOTE) (Chawla et al., 2002), a popular and effective method for handling skewed distributions and class imbalance. SMOTE creates new synthetic data samples that are similar to existing data samples in the minority class. To generate new samples, it interpolates between the selected instance and its k-nearest neighbor in feature space. SMOTE works by synthesising the extra minority sample based on the feature similarities between the existing minority instances. Given an imbalanced dataset T, for each minority class instance $x_i \in$ T, the SMOTE algorithm first searches the K-nearest neighbor for x_i using Euclidean distance after which one of the K nearest neighbours is randomly chosen and the feature vector difference between x_i and its corresponding nearest neighbours calculated. Finally, the feature vector difference multiplies a stochastic number and adds the new vector to x_i. The mathematical formulation for synthesising a new minority sample can be shown as:

$$x_{new} = x_i + \left(\mathrm{x}_i^k - x_i\right) \times \delta,$$

where x_i^k is one of the nearest neighbours to x_i and δ is a random value which belongs to (0,1). Therefore, the synthesised minority instance x_{new} is a point along the line segment joining x_i and nearest neighbour x_i^k.

8 Base Learners

Intuitively speaking, the success of an ensemble classifier is hugely attributed to the robustness of the base learners, the diversity of the base learners and the ensemble selection strategy. To introduce more diversity and generate a pool classifier that are accurate and diverse, two popular base learners namely: XGBoost and Logistic Regression are employed. The two base learners have strong interpretability and recognition capabilities in both static and dynamic environments such as credit scoring where variables often drift with time. The two base learners achieve a good balance between accuracy and efficiency. A brief description of the two base learners employed in this study is provided in this section.

9 Logistic Regression

Logistic regression is used to solve regression and classification problems as a statistical technique and is regarded as a benchmark technique in credit scoring (Lessmann et al., 2015). Logistic regression performs regression analysis to describe the relationship that exists between the independent variable x and the dependent variable Y and to predict the dependent variable Y. Logistic regression adds a logistic function on the basis of regression. In credit scoring, the probability of future results is predicted by the performance of historical data from applicants. The task of Logistic regression is to evaluate whether the feature vectors of customers belong to a predefined category, default or nondefault. The Logistic regression models is widely used in credit scoring tasks due to their strong interpretability of results and pattern recognition abilities.

10 Extreme Gradient Boosting (XGBoost)

To solve real life classification problems, Chen and Guestrin et al. (2016) proposed the XGBoost algorithm. The algorithm is employed by a number of winning solutions in Kaggle machine learning competitions to train models due to its ability to mitigate model variances. XGBoost employs a Taylor's expansion to quickly approximate the loss function, and this creates a model capable of balancing both bias and variance by the use of fewer trees to achieve superior generalisation ability. In addition to that, a regularised term is appended to the loss function to control the complexity of the tree. As the level of complexity increases for the learning of trees, the normalisation prevents the problem associated with over-fitness. The XGBoost learning algorithm has the capacity to handle sparse data, implement distributed and parallel computing flexibly (Wang et al., 2017). XGBoost employs both first and second derivatives and the generated loss function is considered to be more accurate and thus enhancing its ability to precisely split the tree and create the suitability of the tree structure for financial data characteristics.

11 Incremental Adaptive Heterogeneous Ensemble

An ensemble method is a set of classifiers that learn a target function and their individual predictions or outputs are combined to classify new training instances. Ensembles of classifiers generally improve the generalisation performance of a set of classifiers on a domain. In this study, we propose the Incremental Adaptive Heterogeneous Ensemble (IAHE) for credit scoring for big data. The framework of our proposed approach is composed of the three fundamental steps namely: pool generation, ensemble selection and ensemble fusion. In the pool generation, an initial pool of classifiers is establish using the dataset D_{train}. According to Lessmann et al. (2015), we implement a heterogeneous ensemble architecture for our proposed approach. The base models are derived from Logistic Regression and XGBoost. After the generation of the initial pool, the subsequent task is to select classifier that are accurate and diverse. Dynamic ensemble selection is applied. The approach chooses base models according to some fitness function for different groups of test samples. In this study, the ensemble of classifiers is determined in a dynamic fashion (Cruz et al., 2017). Intuitively speaking, the success of an ensemble classifier is hugely attributed to the diversity and accuracy of classifiers. At best, base models should be accurate and diverse (Zhou, 2012).

The selection by accuracy and diversity (SAAD) (Yang, 2011) algorithm is used to select classifiers based on accuracy and diversity. The SAAD algorithm initially trains a set of heterogeneous classifiers. The accuracy of each classifier is then determined on a validation set. Top accurate classifiers are then selected. Diversity among the top accurate classifiers is measured. The classifiers with strong diversity are selected into the ensemble and the selection process is repeated until the predetermined size of the ensemble. The majority voting is then used to combine classifiers into an ensemble.

Due to its simplicity and ease of interpretation. The Q Static (Yule, 1900) is used as a diversity measure.

12 Hyperparameter Optimisation

To allow dynamism and create an all-encompassing approach, this study uses Particle Swarm Optimizers (PSO) to optimise hyperparameters of the two learning algorithms namely: XGBoost and Logistic regression. The implementation of PSO to optimise hyperparameters helps to acquire good hyperparameter setting at a lower cost of computational resources and improving the rate of convergence. Particle Swarm Optimizers is an extensively used heuristic evolutionary computational algorithm developed by Kennedy & Eberhart, (1995). PSO is a heuristic population based iterative, global and stochastic optimisation algorithm inspired by the social behavior of bird flocking or fish schooling to conduct an intelligent search for the optimal solution (Engelbrecht, 2002). The idea behind PSO is to find the optimal solution through an iterative and collaborative sharing among individual particles in a swarm. At each iteration, each particle is optimised according to both its optimal location and the optimal location of all particles. PSO is derivative free as it does not require the optimisation problem to be differentiable, therefore not requiring gradients making it applicable to a variety of problems such as those with discontinuous or nonconvex and multimodal problems. To introduce heterogeneity among the swarm particles, we instantiate swarm particles at individual level. Instantiating individual particles enable particles in a swarm to assume different search behaviours by randomly selecting velocity and position update rules from a behaviours pool thereby creating a swarm that consists of explorative particles and exploitative particles, giving the optimisation algorithm the ability to explore and exploit throughout the search process thereby avoiding premature convergence.

13 Performance Metrics

To appropriately perform a comprehensive prediction performance comparison of our proposed approach and benchmarks, six representative evaluation measures are selected. The selected performance metrics are Accuracy (ACC), AUROC, Brier Score, F1 Score, Type 1 and Type 11 errors. The Receiver Operating Characteristics (ROC) is a popular graphical performance metric widely used to assess the performance of credit scoring. The AUC curve effectively measures and performs a comparison of the performances of credit scoring models. The AUROC curve evaluate the discriminatory power of a credit scoring model which can be interpreted as the probability that good customers receive better scores than default ones (Niu et al., 2019). In the ROC curve, the x-axis represents the false positive rate (FPR), and the y-coordinates denotes the true positive rate (TPR). The FPR is the ratio of samples incorrectly classified as bad applicants where the real labels are good applicants.

$$\mathrm{FPR} = \frac{FP}{FP + TN}$$

The TPR is the ratio of samples correctly classified as bad applicants where the labels are bad applicants as well.

$$\mathrm{TPR} = \frac{TP}{TP + FN}$$

The Accuracy (ACC) performance metric measures the prediction ability of the credit scoring model to accurately discriminate good from bad applicants. Accuracy can be expressed as:

$$\mathrm{Acc} = \frac{TP + TN}{TP + FN + FP + TN}$$

The Type 1 error provides an indication of the proportion of samples whose status is good that are incorrectly predicted. I can be expressed as:

$$\mathrm{e} - 1 = \frac{FP}{FP + TN}$$

The Type 11 error provides a measurement of the misclassification ratio of bad applicants and can be expressed as:

$$\mathrm{e}-11=\frac{FN}{TP+FN}$$

The Brier Score provides a description of the average probabilistic prediction error. It is expressed as:

$$\mathrm{BS}=\frac{1}{N}\sum\nolimits_{i=1}^{N}(p_i-y_i)^2$$

The F1-Score takes into account the precision and the recall of learning models. It is expressed as the harmonic average of both precision and recall and ranges within the interval of 0 to 1. The F1-Score can be expressed as:

$$\mathrm{F1}=2\frac{precision}{precision+recall}$$

Precision is the proportion of positive samples in positive cases and is defined as:

$$\mathrm{Precision}=\frac{FP}{TN+FP}$$

Recall is expressed as the proportion of predicted positive cases in the total positive cases and is expressed as:

$$\mathrm{Recall}=\frac{TP}{TP+FN}$$

14 Experimental Design

The effectiveness and efficiency of our proposed approach is validated on four datasets. The datasets are widely used in related literature for credit scoring. This makes it feasible to perform a detailed comparison of the approach with other studies.

The first dataset is called the Shandong dataset. To encourage enterprises, social organisations and individuals to compete and explore the innovation application of big data, accelerate the development of and utilisation of public data resources from a normalised docking mechanism between data suppliers and data demanders and promote the development of the digital economy and information technology, the Shandong public money dataset was published. The objective of publishing the dataset was to establish an accurate risk control model based on real scenes and practical applications using basic personal identity information, personal housing provident fund deposits and loan data information, to predict whether the user will be overdue repayment.

Table 1 Four credit datasets details

Dataset	#Samples	#Features	Good/bad
Shandong	40,000	19	37,243/2757
GiveMeSomeCash	150,000	10	139,974/10,026
Fannie Mae	369,335	18	340,458/28,877
BankFear	532,428	32	406,601/125,827

The Shandong dataset is accessible at https://data.sd.gov.cn/cmpt/cmptDetail.html?id=26.

The second dataset is called the Fannie Mae dataset which is a mortgage dataset. The objective of publishing the Fannie Mae dataset is to expand the secondary mortgage by scrutinising mortgages as mortgages based securities thereby enabling borrowers to recycle their investments in further loans. The Fannie Mae dataset can be accessed at: https://capitalmarkets.fanniemae.com/credit-risk-transfer-/single-family-credit-transfer/.

The third dataset is called The Give Me Some Cash dataset. The Give Me Some Cash (GMSC) dataset is derived from the Machine Learning competition in the Kaggle community. The dataset consists of 150,000 instances. Around 139,974 samples are fully paid and 10,026 are default samples. The Give Me Some Cash dataset is available on the Kaggle platform and can be accessed on: https://www.kaggle.com/c/GiveMeSomeCredit.

Participants are encouraged by the Kaggle competition to predict the likelihood that a customer can experience financial distress in the next two years with the objective of improving their credit score.

The fourth dataset is the BankFear dataset. The dataset is released by Indessa Bank. It is composed of 532,428 samples and has 32 features. About 406,601 are fully paid and 125,827 are default. The BankFear dataset can be accessed at: https://www.kaggle.com/codenamekash/bank-fears-loanliness.

Details of the four credit datasets are shown in Table 1.

15 Experimental Results

In this section, a performance comparison of the proposed model and the benchmarks is performed. All the empirical experiments are conducted using Python 2.7 on a PC with 3.6 GHz, 24 GB RAM and windows 10. The prediction results of benchmark models across datasets and evaluation metrics are presented as baseline of the proposed approach. Ten benchmark models namely: OCHE (Yufei Xia et al., 2020), Btstacking (Yufei Xia, 2018), LSTM (Feng Shen, 2021), META-DESKNN-MI (Wen-hui Hou et al., 2020), APSO-XGBoost (Chao Qin, 2021), Heter-DF (Wanan Liu et al., 2022a, b), GAM-GEV (Mushava & Murray, 2018), AugBoost-RFS (Fan et al., 2022), GSCI (Xu et al., 2023) and IAHE.

Six performance metrics are used to evaluate the effectiveness and efficacy of the proposed IAHE approach. Table 2 shows the average prediction performance of each benchmark model on six performance metrics. The incremental Adaptive Heterogeneous Ensemble (IAHE) performs the best among the four datasets in most cases among the evaluation metrics.

16 Comparison of Computational Cost (Table 3)

The result of assessing the computational cost of the benchmark models reveals a tradeoff between computational cost and model performance. Models based on algorithms use a few computational resources even though their generalisation performance is poor when compared to benchmark models. For datasets with more features and are large, the training process is slowed down. The dynamic selective heterogeneous process employed by IAHE credit scoring model shows a comparative performance.

17 Statistical Tests of Significance

The non-parametric Friedman ranking test is employed for the ten baseline models for the determination of significant statistical differences. Reliable comparisons can only be demonstrated through the integration of different evaluation measure, given that they exhibit different merits and limitations. To properly conduct the statistical differences of prediction performance, the author suggested the application of non-parametric tests in place of k + 1 parametric tests due to the fact that the parametric tests assumptions are often violated in the process of comparing learning models. The Friedman test has a null hypothesis which highlights those differences existing among rankings of the ten baseline models is neither accidental nor influenced by their significant levels. When the hypothesis of the test is rejected, the post hoc Nemenyi test (Demsar, 2006) can be administered for paired comparisons.

The Friedman statistics is calculated as follows:

$$\chi_F^2 = \frac{12N}{K(K+1)}\left[\sum\nolimits_j AR_J^2 - \frac{k(k+k+1)2}{4}\right]$$

The variable k represents the number of models while N represents the number of datasets. AR_J^2 represents average rankings of the j-th model over all the datasets. When a significant average difference among the models is identified, it results in the rejection of the null hypothesis of the Friedman test for a given evaluation measure.

Table 2 Comparison of the performance of credit score models on all datasets

Dataset	Model	Accuracy	AUC	F1	BS	TYPE1	TYPE 11
Shandong	OCHE	81.37	78.13	80.32	0.2172	57.67	13.69
	Bstacking	83.28	79.43	81.27	0.1769	52.83	15.58
	LSTM	79.35	78.28	80.74	0.2359	59.42	14.72
	META-DESKNN-MI	80.46	81.63	80.25	0.1783	68.51	12.63
	APSO-XGBoost	82.34	83.47	80.64	0.2159	63.49	15.78
	Heter-DF	78.56	79.67	77.69	0.1768	66.79	16.38
	GAM-GEV	85.67	84.35	82.64	0.1784	63.39	14.16
	AugBoost-RFS	84.56	80.54	82.26	0.1753	69.45	16.48
	GSCI	83.42	78.75	81.24	0.1649	58.86	13.57
	IAHE	96.43	86.69	84.52	0.1624	58.43	14.48
GMSC	OCHE	83.57	81.43	79.34	0.2233	67.48	16.53
	Bstacking	80.49	80.47	82.49	0.2164	63.84	12.72
	LSTM	79.68	78.43	79.63	0.1773	62.79	13.67
	META-DESKNN-MI	81.28	81.26	83.47	0.1684	59.65	14.83
	APSO-XGBoost	80.34	80.53	81.38	0.2024	64.79	16.29
	Heter-DF	79.73	79.53	81.62	0.2157	62.83	15.68
	GAM-GEV	84.47	83.48	82.67	0.1794	69.85	13.59
	AugBoost-RFS	82.39	81.29	79.83	0.1684	66.58	12.42
	GSCI	80.64	79.43	81.67	0.1679	67.74	14.96
	IAHE	98.67	84.57	85.66	0.1587	65.73	12.34
Fannie Mae	OCHE	82.13	81.23	83.34			
	Bstacking	80.62	80.46	82.37	0.2127	0.1775	13.29
	LSTM	78.36	79.38	77.83	0.2215	0.2267	15.45
	META-DESKNN-MI	80.48	78.31	80.47	0.1763	0.2114	12.83
	APSO-XGBoost	81.24	77.31	79.49	0.1874	0.1794	14.36
	Heter-DF	82.47	81.23	78.39	0.2122	0.1892	13.82
	GAM-GEV	84.57	84.36	83.42	0.1963	0.2174	16.46
	AugBoost-RFS	83.48	82.65	80.69	0.1867	0.1784	13.62
	GSCI	82.72	80.38	82.39	0.1742	0.2169	16.38
	IAHE	96.78	86.78	84.56	0.1867	0.1768	14.56
BankFear	OCHE	82.39	79.48	81.25	0.1683	0.1826	12.32
	Bstacking	80.14	80.43	78.64	0.1439	0.1743	14.43
	LSTM	79.58	77.83	79.53	0.1783	0.2167	15.72
	META-DESKNN-MI	81.38	81.26	80.13	0.2151	0.1869	12.73
	APSO-XGBoost	80.48	80.19	82.27	0.1864	0.2148	15.44
	Heter-DF	82.36	79.43	81.23	0.1763	0.1883	13.78
	GAM-GEV	84.76	83.74	82.13	0.1868	0.2139	14.68
	AugBoost-RFS	83.49	81.36	82.23	0.2165	0.1906	15.28
	GSCI	81.28	79.83	82.19	0.1785	0.1838	12.62
	IAHE	98.37	84.78	85.18	0.1813	0.1744	14.26

Table 3 Computational cost of single training time of models across datasets

Model	Shandong	GMSC	Fannie Mae	BankFear
OCHE	0.47	0.49	1.29	1.41
Bstacking	0.32	0.53	1.74	0.73
LSTM	0.64	1.62	2.54	3.26
META-DESKNN-MI	1.79	3.52	2.26	2.63
APSO-XGBoost	2.82	6.47	4.39	3.92
Heter-DF	4.74	5.49	6.45	3.48
GAM-GEV	0.51	1.39	2.72	2.57
AugBoost-RFS	3.68	4.37	3.43	2.68
GSCI	2.43	1.56	2.38	3.59
IAHE	3.24	3.65	3.67	5.34

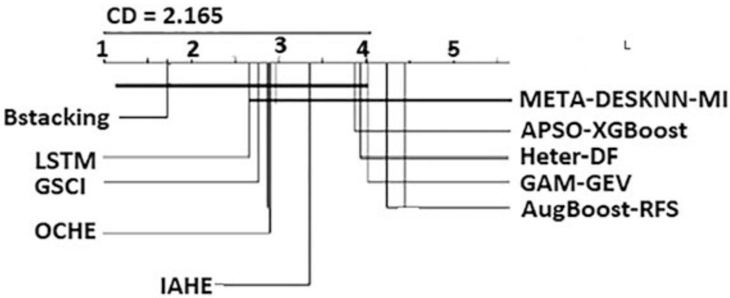

Fig. 1 The CD diagram with results of the Nemenyi Test

Figure 1 shows the results of the significance test. The groups of classification models connected by a line segment do not significantly differ. The IAHE model's performance is significantly superior to OCHE, APSO-XGBoost, Heter-DF and Bstacking.

18 Conclusion

Credit risk analytics process historical and current data into actionable analytical insights to facilitate the assessment of risk by financial institutions and to make lending and account management decisions. To achieve this, financial institutions leverage machine learning and big data in their decision-making process. The process of improving and managing credit risk models is a continuous process. As market conditions, business goals and the emergence of big data sets in, the process of monitoring, testing and recalibrating credit models play a pivotal role in the process of assessing credit risk.

Current trends in credit risk modeling leverage machine learning and big data to accurately predict the probability of default. Due to lack of data, financial institutions are collecting data from social media to distinguish between credit worthy and non-credit worthy applicants and has exploded exponentially into big data characterised by high volume, veracity and variety and the data is often semi-structured and unstructured. The convergence of big data and machine learning therefore is revolutionary assimilation to credit scoring management.

This paper proposed a novel incremental learning approach composed of base models generated from two base learners to enhance diversity. The Incremental Adaptive Heterogeneous Ensemble provides a focus on agility as credit models need to quickly adjust to account for un expected world events and changes in customer behavior. Leveraging machine learning and big data enables credit risk models to cognitively counter bias as lenders have a regulatory and moral imperative to remove bias from their lending decisions. The application of machine learning on big data improves generalisation performance as the credit risk model is able to incorporate internal and alternative credit data such as credit data from different sources.

To validate the efficacy and performance of IAHE, empirical experiments were conducted to assess the generalisation performance. Four real world datasets are used across six metrics to evaluate IAHE and the benchmarks. Prediction results obtained indicate that our approach notably outperforms the majority of homogeneous and heterogeneous ensemble benchmark models. Regarding computational costs, our approach was ranked among the best a few re-source-efficient benchmark models compared. The approach proposed can be im-proved in future by including models generated from more base learners, In addition, different ensemble selection strategies can be explored to optimise prediction performance of credit scoring models.

The IAHE can be improved by incorporating efficient algorithms for handling skewed distribution. In addition, computational efficiency can be improved by including suitable algorithms for feature selection. Future improvements will also include adaptation to drifting variables without hurting model performance.

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The Prominence of Natural Capital Within the Integrated Reports of South African Banks

Garth Barnes

Abstract The impact of Banks on natural capital is significant. The integrated reporting framework (IR Framework) prescribes that integrated reports should include specific 'content elements' (sections). The purpose of this study is to examine the disclosures of natural capital from a South African banking perspective in integrated reports. Within the global context of climate change and biodiversity collapse, the research aims to determine to what extent natural capital is afforded prominence on the whole and within each of the prescribed content elements. A qualitative approach was followed in order to examine the contents of integrated reports. Purposive sampling was used to select a sample of the five largest banks from the total population of all South African banks. The study found that the prominence afforded to natural capital varied widely across the sample. Whilst the content elements of 'Performance'; 'Strategy and resource allocation'; 'Risk and opportunities' and 'Organisational overview and external environment' enjoy the bulk of focus in terms of natural capital prominence, there is limited mention of natural capital in the 'Business model'; 'Outlook' and 'Basis of preparation' content elements. It is concluded that there is a wide range of interpretation of the IR framework with regards to the requirements for reporting on natural capital. It is recommended that future iterations of the framework should take steps towards closing this interpretation gap and that prepares should endeavour to make further disclosures with regards to natural capital in the 'outlook' sections of their integrated reports.

Keywords Integrated reporting · Natural capital · Environmental sustainability and governance (ESG) · Sustainability · Banking · Climate change · South Africa

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1 Introduction

> The conservation of natural resources is the fundamental problem. Unless we solve that problem, it will avail us little to solve all others. (Roosevelt, 1907, p. 44)

Climate change and biodiversity collapse have become two of the most pressing issues of our time for humanity. The scientific evidence exposing the extent to which climate change and biodiversity collapse have progressed in the last century is overwhelming (McMichael, 1993; World Wide Fund For Nature, 2016). The Intergovernmental Panel on Climate Change (IPCC) has reported that the Earth's surface temperature has increased by approximately 1 °C since the pre-industrial era, and this increase is primarily due to human activities such as burning fossil fuels and deforestation (IPCC, 2022). This increase in temperature is causing widespread impacts on the planet's ecosystems, including sea level rise, more frequent and severe heatwaves, droughts, floods, and storms, which are threatening human societies and economies (IPCC, 2022).

Biodiversity collapse is also a significant concern, as the planet is currently experiencing a mass extinction event due to human activities, such as habitat destruction, pollution, and climate change (IPBES, 2019). The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) has reported that up to one million species are at risk of extinction in the coming decades, which would have significant impacts on the planet's ecosystems and human societies (IPBES, 2019).

The key drivers of climate change and biodiversity collapse are human activities, including the burning of fossil fuels, deforestation, land-use change, and unsustainable agricultural practices (IPCC, 2022; IPBES, 2019). These activities are causing the release of greenhouse gases into the atmosphere, which are trapping heat and causing global temperatures to rise. The destruction of natural habitats and the fragmentation of ecosystems are also reducing the planet's capacity to store carbon and provide critical ecosystem services such as water filtration, pollination, and nutrient cycling (IPBES, 2019).

These adverse effects (largely driven by the activities of business and industry) have given rise to increased pressure from stakeholders for corporate entities to disclose more non-financial information as part of their annual reporting in order to communicate their impacts on natural capital (Sciulli & Adhariani, 2023). Several alternative reporting frameworks that extend beyond the purely financial in order to present a more wholistic picture of how businesses impact their environments and stakeholders have been born of this increased stakeholder pressure. One such framework that has enjoyed support, especially in South Africa where it is mandatory for listed companies, is integrated reporting (PWC, 2013).

As significant funders of the abovementioned destructive industrial activities, Banks have a responsibility to report on their impacts on natural capital to stakeholders and society at large (Rainforest Action Network, 2023). Integrated reporting is one of the conduits through which banks can communicate these impacts to these stakeholders. This study aims to take a closer look at the integrated reports prepared by South African banks in order to determine what level of prominence is afforded to items of natural capital significance.

2 Literature Review

2.1 The Evolution of Integrated Reporting

An integrated report is defined as 'a concise communication about how an organization's strategy, governance, performance and prospects, in the context of its external environment, lead to the creation, preservation or erosion of value over the short, medium and long term' (IFRS foundation, 2021, p. 10).

The primary body of research on integrated reporting is focused on exploring the objectives and use-cases for as a means of corporate communication (Beattie & Smith, 2013; Brown & Dillard, 2014; Lodhia, 2015). A number of studies unpack the main challenges and successes of integrated reporting since the release of the initial integrated reporting framework in 2013 (Adams et al., 2016; Sierra-Garcı'a et al., 2015). There is also a significant volume of research investigating the outcomes and effects that arise from the employment of integrated reporting (Barth et al., 2017; Lee & Yeo, 2016; Mervelskemper & Streit, 2017; Vitolla & Raimo, 2018).

Fundamental to the principles of the IR framework is the concept of 'Capitals' of which there are six: Financial, Manufactured, Intellectual, Human, Social and relationship and the focus of this study: Natural capital. The concept of natural capital has gained significant attention in recent years due to the increasing awareness of the impacts of business activities on the environment and society. Natural capital can be defined as all renewable and non-renewable stocks of natural resources, such as forests, water, and minerals, that provide goods and services to an organization or society (IFRS Foundation, 2021). The integration of natural capital considerations into corporate reporting is a key aspect of integrated reporting, which seeks to provide a comprehensive and integrated view of an organization's performance across multiple dimensions, including financial, environmental, and social (IFRS Foundation, 2021).

The evolution of corporate reporting on natural capital has been significant since the 1990s as companies have increasingly recognized the need to account for their impacts on the environment and society. In the 1990s, environmental reporting was primarily focused on compliance with regulatory requirements, and reporting tended to be voluntary and unstructured (Gray et al., 1996). However, as the awareness of the environmental impacts of business activities increased, companies began to adopt more systematic approaches to environmental management, which included the development of environmental management systems and the use of environmental performance indicators (EPIs) (Unerman et al., 2007).

In the early 2000s, sustainability reporting emerged as a key trend in corporate reporting, driven by the increasing demand for transparency and accountability from stakeholders (Gray et al., 1996). Sustainability reporting focused on the social and environmental impacts of business activities and provided a broader view of corporate performance beyond financial metrics (Simnett et al., 2009).

Since the development of the IR framework as by the International Integrated Reporting Council (IIRC) in 2013, there has been a shift towards integrated reporting, which seeks to provide a more comprehensive and integrated view of an organization's performance across multiple dimensions, including financial, environmental, and social (IFRS Foundation, 2021). Integrated reporting encourages companies to report on their natural capital impacts and dependencies, and to consider natural capital as a key aspect of their business strategy (IFRS Foundation, 2021).

However, there are still challenges to the effective integration of natural capital considerations into corporate reporting, including the lack of standardized natural capital accounting frameworks, difficulties in measuring and valuing natural capital impacts, and the need for more stakeholder engagement and disclosure (Bebbington & Unerman, 2018).

The evolution of corporate reporting on natural capital has been significant over the past few decades, as companies have increasingly recognised the need to account for their impacts on the environment and society (Atkins & Maroun, 2015). From voluntary and unstructured reporting in the 1990s to the emergence of sustainability reporting and integrated reporting, corporate reporting on natural capital has evolved to provide a more comprehensive and integrated view of corporate performance. However, challenges still exist in the effective integration of natural capital considerations into corporate reporting.

Integrated reporting has been lauded for its potential to promote sustainability and accountability in corporate reporting (King, 2012; PWC, 2013). However, some scholars have raised concerns about the potential for integrated reporting to be used as a tool for greenwashing (Milne & Gray, 2013; Flower, 2014). Greenwashing refers to the practice of making false or misleading claims about a company's environmental performance to give the impression of being more sustainable than it actually is. Greenwashing can also be the more subtle act of simply omitting the true extent of negative practices.

In the context of integrated reporting, companies may use the IR framework to selectively report positive sustainability initiatives while downplaying negative environmental impacts or risks. This selective reporting can undermine the credibility of the integrated reporting framework (Adams et al., 2016).

Some studies have shown evidence of greenwashing in integrated reports. For example, Sciulli and Adhariani (2023) conducted a content analysis of integrated reports and found that companies tend to emphasize positive sustainability initiatives while underreporting negative environmental impacts or risks. Similarly, Marquis et al. (2016) found that companies use vague and ambiguous language to report on sustainability, which can obscure the true environmental impact of their operations. These findings suggest that integrated reporting may be susceptible to greenwashing and highlight the need for companies to be more transparent and comprehensive in their reporting.

2.2 The Role of Banks and Their Impact on Natural Capital

The banking industry plays a critical role in shaping the economy and influencing corporate behavior (Elliott & Lofgren, 2022; Cogan, 2008). The direct impact of banks on natural capital is somewhat limited due to the nature of the business. Banks are quick to define this direct impact as water usage, carbon emissions and other minor waste metrics (e.g. paper usage). They are open and transparent when including this quantitative data in their integrated reports. What is less obvious but potentially much more impactful, is the indirect impact these businesses may have on natural capital through their business activities.

One significant indirect impact of their activities is the environmental impact caused by their investment in business and industry. This section outlines how the banking industry may have an impact on the environment through these investment activities and explore some of the potential consequences of this impact.

The banking industry is a significant source of funding for business and industry, providing capital for investment and expansion. The investments made by banks are not only limited to companies in the financial sector but also in sectors such as energy, transportation, agriculture, and manufacturing. The environmental impact of these investments varies, but it can range from significant contributions to greenhouse gas emissions, deforestation, and water pollution, to habitat destruction and the depletion of natural resources.

For example, the fossil fuel industry, which is one of the largest recipients of bank financing, is a major contributor to greenhouse gas emissions, causing climate change and its associated impacts (Rainforest Action Network, 2023). Agriculture and food production, which is another significant recipient of bank financing, are responsible for significant land-use changes, deforestation, and biodiversity loss. These investments can have long-term consequences for the environment and human well-being (Rainforest Action Network, 2023).

2.3 Consequences of Banking Investment in Business and Industry

The consequences of banking investment in business and industry are not limited to environmental impacts but also include financial, social, and reputational risks for banks. Environmental issues such as climate change, biodiversity loss, and natural resource depletion are not only critical for society at large, but they also pose significant risks to businesses, which can ultimately impact the financial performance of banks and their clients (Sustainable Banking & Finance Network, 2021). Additionally, banks can face reputational risks if their clients engage in environmentally harmful practices, which can damage their brand and stakeholder relationships (Eccles & Serafeim, 2013).

In response to these risks, some banks have started to adopt sustainable finance practices, such as responsible lending, green bonds, and impact investing (Global

Alliance for Banking on Values, 2022). Sustainable finance practices can help to reduce the environmental impact of banking investments, enhance the resilience of businesses to environmental risks, and improve stakeholder relations. However, the adoption of sustainable finance practices is still in its early stages, and there is a need for more significant efforts to align banking investments with environmental and social sustainability goals.

2.4 Integrated Reporting, Natural Capital and the Banking Industry

Whilst there is a wealth of literature exploring integrated reporting in the banking sector on a global level, there is very little research narrowing in on the South African banking sector and still less research directed specifically at natural capital in this context. This further reinforces the motivation and need for focused research in this area. The following section outlines some of the prominent studies relating to Integrated reporting in the banking sector.

Doni, et al. (2019) explored the Development Bank of Singapore (DBS) as one of the pioneering banks from an integrated reporting perspective. The study investigated the banks approach to the accounting for multiple capitals and found that this approach was useful in making tradeoffs between capitals (e.g. financial versus natural capital) visible to stakeholders. This study is however not specific to natural capital and furthermore, considers only one bank outside of South Africa.

In 2019 a sample of listed South African banks was found to show a direct positive correlation between the quality of a banks integrated reporting and its earnings per share (Matemane & Wentzel, 2019) There study does not however specifically address the prominence or direct impact of natural capital specific disclosures.

Vitolla et al. (2020) investigated the determinants of quality integrated reports in the financial sector across multiple territories and found that profitability and size were key determinants when observing the quality of integrated reports. Although there were some South African banks included in the study, there has not been a specific study on South African institutions in this regard. However one could reasonably assume that a similar trend might follow if such a study was performed and that large banks such as the ones sampled in this research could be expected to produce integrated reports of a high quality as they are well funded and resourced.

3 Research Objective

This research was undertaken with the intention of determining the extent to which the major South African banks afford reporting prominence to their impacts on natural capital within the various content elements prescribed by the integrated reporting framework in their integrated reports. The focus of the study is narrow, it does not seek to comment on the quality of the observed reporting but rather to establish the status quo of natural capital prominence in integrated reports, and to draw conclusions from these findings.

4 Underlying Theory

This research is underpinned by the capital theory approach. The capital theory approach is widely recognised as the de facto theoretical basis for sustainability. Capital theory, in the context of sustainability, refers to an economic framework that emphasises the importance of different types of capital in determining long-term well-being and sustainable development. It recognises that economic growth and development should not be solely measured based on financial capital, but also on natural, social, and human capita (Stern, 1997). This study is focused on the natural capital pillar of this approach.

5 Research Approach and Method

Data was collected through the examination of text included in publicly available integrated reports for the sample. As the data collected is not numerical, a qualitative approach was deemed appropriate. Lehman (2010) outlines how interpretative research can be used as a particularly useful tool within the discipline of accounting to 'Obtain an improved understanding of everyday accounting practice' and so, an interpretive approach was used to analyse the data collected.

5.1 Sample Selection

The population considered for sampling included all south African banks. The Prudential Authority annual report for 2022 notes that South Africa's banking landscape is dominated by five banks that together carry over 90% of the country's banking assets (SARB, 2022). Purposive sampling was used to select these five banks as the sample. The institutions are listed entities and are therefore required to prepare integrated reports in terms of the Johannesburg Stock Exchange listing requirements. The latest available integrated reports (2022) for these five banks represent the sample for the study providing a high level of coverage over the total Rand value of all banking assets held in South Africa.

5.2 Ethical Considerations

Written ethical clearance was received from the University of Johannesburg School of Accounting research ethics committee. In addition, the data analysed is obtained from publicly available reports, and the names of the banks have been omitted from the study as an additional precaution.

5.3 *Qualitative Content Analysis of Integrated Reports*

Qualitative Content Analysis, also known as ‘QCA,’ is a research method used to analyse and interpret qualitative data (Schreier, 2012). It is particularly useful when working with data collected from sources like documents that require interpretation. Given that this study involves extracting qualitative data from documents, specifically the integrated reports of the top 5 South African Banks, QCA is considered an appropriate approach.

A coding system was used to assess the prominence of reporting on natural capital for the sample. The integrated reporting framework (<IR> Framework) is considered the global standard for entities preparing integrated reports. In terms of this framework, preparers should include the following content elements in their reports (IFRS Foundation, 2021):

Organisational overview and external environment
Governance
Business model
Risk and opportunities
Strategy and resource allocation
Performance
Outlook
Basis of preparation and presentation

For the reports examined, each section was scrutinised for evidence of terminology used to provide information on natural capital in order to make a judgement on the prominence of natural capital in the tested reports. For each mention of these natural capital elements, a score of ‘1’ was awarded. At the end of the report review, the total score was summed to calculate a natural capital prominence score (NCPS) depicting the level of prominence enjoyed by natural capital in each of the different sections and in the reports as a whole.

It is not enough to simply search for the term ‘natural capital’ as this is a general term and there are many other more specific terms that would fall within the scope of natural capital. Identification of these terms was an iterative process, and the list of relevant terminology was extended for each report to include all possible variations of terms that could be used to indicate natural capital implications. The following list (and their acronyms) represents all terminologies identified during the review of the reports:

Biodiversity
Carbon
Carbon Dioxide
Climate
CO_2

Decarbonise
Emissions
Energy
Environment
Equator principles
Extreme weather
GHG
Global Warming
Green
Greenhouse gasses
Natural capital
Nature
Net-zero
Planet
Paris agreement
Renewable energy
Renewables
United nations sustainable development goals
Water
Wildlife

It is important to note that the context in which each of these terms was used is important. A score of '1' was only awarded where the term was being used within the context of natural capital. For example, for the following sentence 'the management team displayed renewed energy when tackling their post covid responsibilities...' 'energy' would not attract a score as it was used in within a context not related to natural capital. Similarly, the general use of terms or acronyms such as 'ESG' or 'UN sustainability goals' did not attract a score unless the term was being specifically used within the context of reporting on natural capital.

6 Study Results

This section presents the findings of the study and interprets the results. The top 5 South African banks (based on asset value) were analysed using the content analysis method described in Sect. 5.3. These banks were evaluated against a checklist of natural capital related terminology in order to establish the extent of prominence afforded to natural capital in the various content elements of integrated reports and in the reports as a whole.

6.1 Overall Prominence of Natural Capital

This section presents and interprets the findings of the study with regards to the overall prominence of natural capital reported in the integrated reports of the sample.

Refer to Table 1 and Fig. 1 below where the overall natural capital prominence score is plotted for each bank tested for the reporting period ended 2022.

From Table 1, it can be seen that the mean NCPS for the sample tested was 130, suggesting that on average, items of a natural capital nature were mentioned 130 times in each report. The relevance of this figure is, however, questionable when one considers the standard deviation of 111 for the data set. This high standard deviation suggests that there is a large variance (visible in Fig. 1) between reports and in general, an inconsistent result across the sample. In addition, when considering the sample maximum of 293 and minimum of 6, there is a large variance across the sample in terms of the overall prominence afforded to reporting on natural capital items. It is worth noting that the score of 6 was as a result of the report specifically excluding natural capital from the integrated report and referring users to a separate report on the matter. With the above in mind there appears to be no discernable trend or identifiable norm in the prominence of reporting on natural capital in this sample. This was an unexpected result as one of the guiding principles of the IR framework is 'Comparability' between reports. A possible explanation for this variance is the fact that the IR Framework adopts a principles-based approach rather than a rules-based

Table 1 Overall NCPS Score for the reporting period ended 2022

Bank	NCPS		
A	176	Mean	130
B	6	Max	293
C	63	Min	6
D	111	Std deviation	111
E	293		

Source: Author

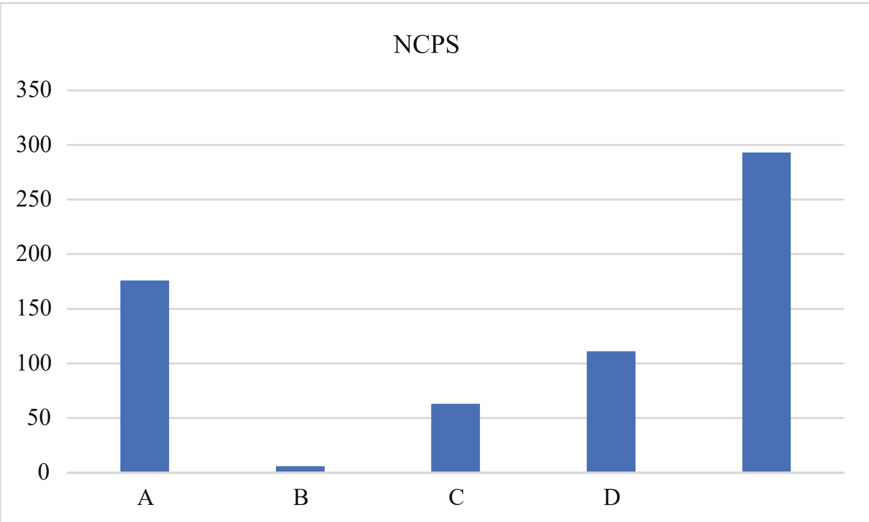

Fig. 1 Overall NCPS Score for the reporting period ended 2022. Source: Author

approach. The framework provides a set of guidelines and as such, there is much room for preparers to interpret the guidelines and provide a wide range of outputs based on their materiality definitions and the importance that they place on natural capital. Whilst it is understandable that there would be some variance between the various reports in the prominence they afford to natural capital, one would expect a closer range given that the reports are prepared for entities in the same sector that are using the same IR framework which includes 'Comparability' as a fundamental guiding principle.

6.2 *Prominence of Natural Capital Reporting Across the Content Elements*

Here we zoom in and analyse the distribution of the NCPS across the content elements of the sampled integrated reports (Fig. 2):

Table 2 shows the distribution of natural capital reporting as measured by the NCPS for each bank as a whole and also as it pertains to each content element. This

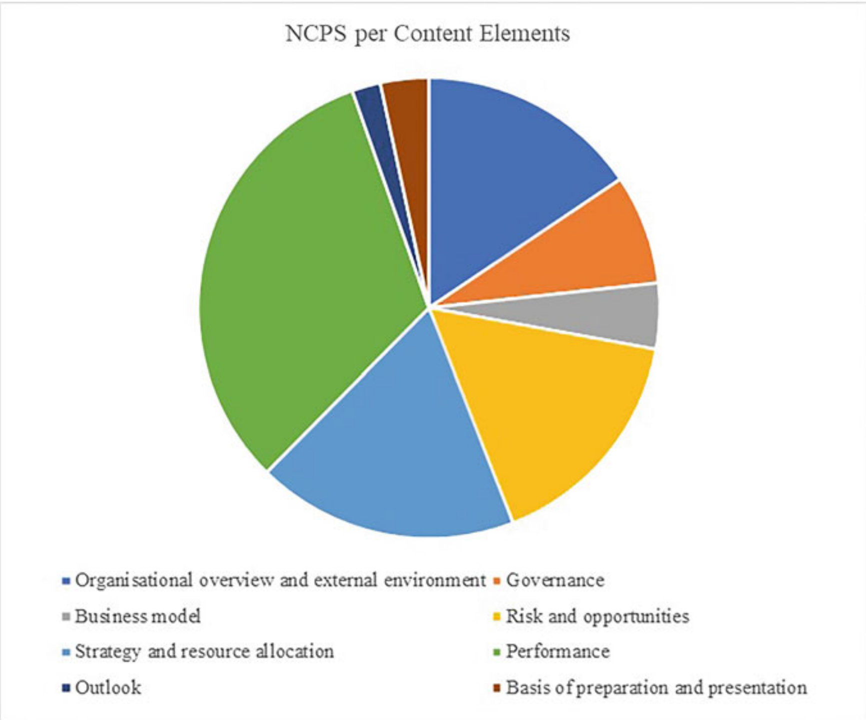

Fig. 2 NCPS per content elements. Source: Author

Table 2 NCPS per content elements

	Banks														
	A		B		C		D		E		Total				Std
Content elements	NCPS	%	NCPS	%	NCPS	%	NCPS	%	NCPS	%	NCPS	%	Max	Min	Deviation
Organisational Overview and external environment	49	28	1	17	6	10	7	6	38	13	101	16	49	1	22
Governance	2	1	0	0	0	0	2	2	46	16	50	8	46	2	20
Business model	5	3	0	0	12	19	13	12	0	0	30	5	13	0	6
Risk and opportunities	7	4	0	0	26	41	42	38	30	10	105	16	42	4	17
Strategy and resource allocation	59	34	0	0	1	2	16	14	43	15	119	18	59	1	26
Performance	42	24	0	0	13	21	23	21	131	45	209	32	131	0	52
Outlook	7	4	3	50	3	5	0	0	0	0	13	2	7	0	3
Basis of preparation and presentation	5	3	2	33	2	3	8	7	5	2	22	3	8	2	3
Total	176	100	6	100	63	100	111	100	293	100	649	100			

Source: Author

table is particularly useful as it provides insight into how banks consider reporting their impacts on natural capital on a more granular level.

From the table, we can see that across the sample, 32% of the total natural capital reporting prominence was focused in the 'Performance' content element section suggesting that the banks tested place the most importance on this section when communicating natural capital impacts to users.

18% of natural capital prominence was concentrated in the 'Strategy and resource allocation'. This indicates that the sampled banks consider the communication of natural capital impacts to users when communicating the businesses overall strategy and how natural capital resources are allocated towards production of similar importance to the communication of 'Risks and opportunities' and 'Organisational Overview and external environment' which each received 16% of the distribution.

The 'Outlook', 'Basis of preparation and presentation', 'Governance' and 'Business model' content elements all received less than 10% each of the natural capital reporting prominence. For 'Basis of preparation and presentation' (3%) this was to be expected as this is generally a shorter section in integrated reports. This argument could potentially also be applied to the 'Governance' and 'Business model' sections, however the 2% 'Outlook' allocation is considered low and suggests that reporting enterprises are not fully considering and disclosing the future impacts of their operations on natural capital. The IR framework states that 'An integrated report should answer the question: What challenges and uncertainties is the organization likely to encounter in pursuing its strategy, and what are the potential implications for its business model and future performance?' (IFRS foundation, 2021, p. 46). The 'Risks and opportunities' content element section returned 16% of the total natural capital prominence suggesting that natural capital was well identified and documented as a risk to the reporting entities, however the low 'Outlook' allocation suggests that the preparers did not sufficiently communicate the implications for these risks for the future.

7 Conclusion and Recommendations

It was found that as a whole, there was a wide variance between the scores across the sample tested with no discernable trend as to what level of natural capital prominence can be expected from an integrated report in the South African banking sector. The distribution of the natural capital reported in each content element section was then analysed where it was found that most emphasis on natural capital reporting was placed on the 'Performance' section with very little prominence evidenced in the 'Outlook' section. It is recommended that preparers increase the level of prominence of natural capital disclosures in the 'Outlook' section of their integrated reports in order to more closely address the fact that they have identified it as a significant risk area in the 'Risk and Opportunities' section of the report. It is further recommended that future iterations of the IR Framework take steps to address the ample room for preparers to interpret the framework (be it through materiality, the guiding principles or other means) in order to foster a more standardised output with regards to natural capital reporting across the banking sector in South Africa.

During the study, the following areas for further research were identified: There is room to expand the study across multiple reporting periods in order to gain insight as to how/if reporting prominence on natural capital has changed over time. Furthermore, while this study focuses on the prominence (volume) of natural capital reporting, there is room to analyse the quality of this reporting in future studies.

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Role of Mining Companies on Youth Capacity Development in Namibia: Stakeholder Theory Perspective

Elizabeth Tuukondjele and Tia Tariro Chata

Abstract The aim of this research paper is to study how Namibia Stock Exchange listed and non-listed mining companies contribute to the capacity development of the youth in Namibia. The study was a qualitative exploration with a population of the study (n = 25) comprising of 18 mining companies, 5 youth organisations and 2 educational institutions. In order to understand the perspectives, experiences and expectations of these stakeholders, data was collected through semi-structured questionnaires which were distributed interviews from a selected sample of the population. A purposive sampling was used to select 10 participants who have relevant knowledge and experience, and primary data was analysed through a thematic analysis in order to identify the patterns, themes and key insights. The findings of the study were that though mining companies have initiatives that are designed to contribute towards the capacity development of the youth in Namibia, the information gathered lacks details on the procedures followed to execute particular programs; the value of the projects was not indicated, it also lacked information on the effectiveness and sustainability of these programs nor did it indicate the metrics that was used to measure the success of the programs and initiatives. The paper recommends that the mining companies' initiatives and programs should provide detailed information on the procedures followed to execute specific programs. That the mining companies should highlight the financial and non-financial resources invested in the initiatives and establish metrics and measurement tools to assess the success of the programs, engage with relevant stakeholders, including government agencies, educational institutions, and youth organizations, to ensure alignment of initiatives with broader national development goals and youth needs, seek partnerships and collaborations with existing youth development organizations and institutions to leverage resources, expertise, and networks for enhanced program outcomes.

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1 Introduction

Namibia is one of the world's largest countries with a land size of 825,615 km^2 and yet sparsely populated with slightly above two million residents (Auala et al., 2015; Byers, 1997). Namibia is a country endowed with natural resources which do not only include minerals, but has the captivating and splendid Namib Dessert, whose wide landscapes are aligned along with the beautiful coastal lines. The World Bank ranks Namibia as one of the world's most unequal countries with a Gini coefficient of 59.1 in 2015. Yet the country has geographic disparities in both economic opportunities and access to services which are large and widening. High levels of inequality result in starkly different poverty rates across different groups, including by age and gender.

El Obeid (2021) as well as Vatuva et al. (2022) describe Namibia's economic performance as one that has revenue that is mineral based, due to that the country is poverty endowed with mineral resources which are uranium, diamond, copper, gold, lead, lithium and zinc including fisheries and flora.

While Namibia is a mineral economic harbor, several studies; Onyebuenyi and Ofoegbu (2022); Kumi et al. (2020) argued that the communal and conservational responsibilities of the mining companies are increasing since mining can positively contribute to poverty reduction if managed properly. While the CSR role of the mining sector has increased, as alluded by Onyebuenyi and Ofoegbu (2022); Tilt et al. (2021), Kumi et al. (2020) that the nonrenewable resources comes with a problematic relationship betweem local communities and mining companies over the depletion of non-renewable natural resources. According to Yu et al. (2023); Ulucak and Ozcan (2020) non-renewable natural resources has a detrimental effect on the environment and that the natural resources replace themselves in a predetermined amount of time. Okafor-Yarwood et al. (2020); Jennings and Bamkole (2019); Rasoolimanesh et al. (2020) argues that mining companies in developing world place much of the importance on blue economy, on pecuniary advantages and less focus on the needs of the local operations in favour of the international corporations and government initiatives. While Holmberg and Sandbrook (2019) adds to it that this is done without the involvement of the concerned communities and with no sensitivity to the need to involve the community for the purpose of social inclusion and environmental sustainability because mining companies tend to recuse themselves from being part of the communities, they operate it and operate in isolation. Different authors (Nason, 2019; Mwakalila, 2022; Guardia-Ortiz et al., 2020) argue that the major issues that contribute to the large youth unemployment rate is the large gap that exists between the skills that are required in the industry and the skills and qualifications owned by the graduates. The paper is divided into four main sections, the first section explores existing research on the topic in the form of a literature review. This is followed by a description and justification of the research methodology employed in this study. Later, the findings are discussed, and ensuing conclusions provided.

1.1 Research Objectives and Questions

The objectives of this research study were to assess the role of mining companies on youth capacity development in Namibia from Stakeholder theory perspective and the study objectives and questions were;

1. Assessed the extent of the role played by mining companies in youth capacity development in Namibia.
2. Identified the primary and secondary stakeholders in youth capacity development initiatives facilitated by mining companies.
3. Evaluated the effectiveness and impact of youth capacity development programs implemented by mining companies in Namibia.

1.2 Research Questions

1. What extent do the mining companies in Namibia actively engage in initiatives that promote youth capacity development?
2. Who are the primary and secondary stakeholders involved in youth capacity development programs facilitated by mining companies, and what are their respective roles and responsibilities?
3. What is the perceived effectiveness and impact of youth capacity development programs implemented by mining companies in Namibia, according to the youth beneficiaries and other relevant stakeholders?

These main objectives and questions provided a focused approach to investigating the role of mining companies in youth capacity development, while considering the involvement of stakeholders and assessing the effectiveness of the programs.

1.3 Research Study Limitations

This section discussed the limitations of the study to provide a comprehensive and translucent valuation of the study's findings and to guide future research in addressing these limitations. This section also provided ways in which the study mitigated the limitations: *Small sample size*: Qualitative research typically involves a small sample size, focused on in-depth exploration. Therefore, the findings may not be broadly generalizable to the entire population of mining companies, youth, or other stakeholders in Namibia. To mitigate this limitation, the research study provided rich contextual descriptions, detailing the selection criteria for participants, and offering clear explanations of the research setting. Additionally, triangulating findings with other quantitative studies in similar research studies to strengthen the credibility and transferability of the findings. *Time and resource constraints*: Qualitative research is time-consuming and resource intensive. Limited time and resources may restrict the scope of the study, the number of participants, or the depth of analysis. To mitigate this limitation, the study prioritized the research objectives and managed time effectively.

2 Literature Review

While youth unemployment is one of Namibia's biggest problems, the mining companies, through their Corporate Social Responsibility initiatives, should strive to reduce the youth unemployment rate with a significant margin.

2.1 Stakeholder Theory

Stakeholder theory manages the relationship that has transpired between the corporations and the stakeholders. CSR refers to the obligations that companies have to the society in which they operate (Kowalczyk & Kucharska, 2020; Morsing & Schultz, 2006).

2.1.1 Primary Stakeholders and their Role in Youth Capacity Development

The primary stakeholder of the study are the mining companies, and their role is to provide financial and material resources to support youth development initiatives. The study of Alnsu-Mensah et al. (2021) contends that, mining companies have a vital role to play in order to enhance capacity development activities of the youth in the developing countries. This is through investing in various education and training initiatives aimed at equipping young Namibians with the skills and knowledge that are vital to incapacitate the youth in readiness of occupation in the any business sectors of the economy in Namibia.

Shilongo (2023a, 2023b) reiterated that mining companies are to design and implement programs that address the needs and aspirations of the youth as well as to collaborate with other stakeholders to maximize the impact and reach of youth development initiatives. Isacowitz et al. (2022) stated that mining companies are expected to monitor and evaluate the effectiveness of programs, making necessary adjustments for improvement as well as to promote responsible and sustainable mining practices that benefit the youth and local communities. Companies should beware of the role they are to take in the communities they operate in as well as the expectations of that role (Leeuwerik et al., 2021. This can be done through their consultative meetings to engage the stakeholders before they undertake the CSR for value creation the company (Kowalczyk & Kucharska, 2020).

Tuokuu et al. (2019) directs that the government as a primary stakeholder has a role of developing policies and regulations that facilitate and support youth development in collaboration with mining companies. Government is supposed to allocate resources and funding to support youth development programs and initiatives. Provide oversight and monitoring to ensure compliance with regulatory frameworks. Facilitate collaboration and partnerships between mining companies, community organizations, and educational institutions for effective youth development (Lauwo et al., 2022).

2.1.2 Secondary Stakeholders and their Role in Youth Capacity Development

The identified secondary stakeholders for this study was the community members (Alnsu-Mensah et al., 2021) who actively participate in the planning, implementation, and evaluation of youth development initiatives. The community members provide input, feedback, and local knowledge to ensure the programs address the specific needs of the community. They provide support and advocate for the empowerment and well-being of youth in the community. As well as promoting collaboration and social cohesion within the community to enhance the effectiveness of youth development efforts. The youth are the other identified secondary stakeholders, and as beneficiaries the youth has a role to engage actively in youth development programs, taking advantage of the opportunities provided. Educational Institutions are equally a secondary stakeholder for mining companies in this research study. Their role is to collaborate with mining companies to design educational and skill-building programs that align with the needs of the industry (Gurung et al., 2023). Education institutions are to provide training, mentoring, and career guidance to youth to enhance their employability in the mining sector. They should facilitate internships, apprenticeships, and job placement opportunities for youth in collaboration with mining companies. Conduct research and analysis to inform the development of relevant educational programs and policies (Caron et al., 2019).

2.2 Initiatives by Mining Companies Towards Youth Empowerment

Ismail and Mujuru think that work practical orientation or internship is encouraged to be a culture of the companies as well as a sustainable plan for youth employment. Mining companies can provide internship programs for students and young graduates to gain practical experience in the industry. Such programs can help young people to develop their skills, knowledge and confidence, and also provide them with networking opportunities (Baruah & Biskupski-Mujanovic, 2021; Fox & Gandhi, 2021). According to Korb and Bornman (2021) mining companies can provide training and mentorship programs for the youth for the purpose of pursuing a career in the mining industry. The aim of such programs would be to develop the skills, knowledge and attitudes needed to succeed in the industry. Mining companies can also provide scholarships and bursaries to young people who are interested in studying mining-related courses at university or college. This can help to increase the number of young people who have a passion in in pursuing a career in the mining industry, and also help to develop enough highly skilled and driven individuals who can be effective in the development of this mining industry for the sake of sustainability of the workforce (Adach-Pawelus et al., 2021).

Mining companies can also involve local communities to provide training and development opportunities for young people through initiatives such as job fairs, workshops, and skills training programs, as well as community development projects (Bester, 2022). Such initiatives can help to build relationships with local communities, and also add value to the communal and financial growth. Finally, mining companies can invest in education initiatives that focus on developing the capacity and knowledge for the benefit of the young people in the mining companies (Mehahad & Bounar, 2020). By investing in education, mining companies can help to guarantee that there is enough skilled and knowledgeable individuals for the purpose of contributing to its growth and development.

2.3 Effectiveness of Initiatives and the Metrics to Measure Success

There are several stakeholder tools that can be used to measure the effectiveness of mining companies' efforts towards youth capacity development. Some of these tools include: Impact assessments tools, which involves conducting a detailed analysis of the outcomes and impacts of the company's youth capacity development programs, such as changes in engagement rates, income levels, and skills development.

3 Research Methodology

This study's research objectives were to discuss the role of the both listed, and none listed mining companies on youth capacity development in Namibia from stakeholder theory perspective and to describe the current state of youth capacity development in Namibia, and how do mining companies contribute to this development. Furthermore, the study aims to identify the specific programs or initiatives

Table 1. Research methodology summary

Philosophy	The research philosophy used was interpretivism philosophy.		
Research design	The study was qualitative research which was used since it allowed for an in-depth exploration of the phenomena stakeholder theory and capacity development.		
Population & Sample	*Population Size*	*Sample Size (# of representatives)*	*Codes of respondents*
Mining companies	18 (base metals and rare metals, nuclear fuel minerals and precious stones)	3	MM1, MM2, – MM3
Mining community members	3	3	CM1, CM2, CM3
Youth organisations	5	2	YO1, YO2
Educational institutions bursars	2	2	ED1 ED2
Totals	**25**	**10**	
Sampling technique	Purposive sampling method was used.		
Data collection	Primary data collected with open ended questionnaire. Secondary data collected from mining companies' websites.		
Data analysis	Qualitative data was thematic analysed to identify patterns, themes, and key insights.		

implemented by mining companies in Namibia to develop the skills and capacities of youth in the country. Lastly the study assessed the effectiveness of mining companies' efforts towards youth capacity development, and what metrics are used to measure success (Table 1).

4 Research Findings and Discussions

This section will discuss the research findings of the research study.

4.1 Economic Condition of the Youth in Namibia

Different authors (Nason, 2019; Mwakalila, 2022; Guardia-Ortiz et al., 2020) argue that the major issues that contribute to the large youth unemployment rate is the large gap that exists between the skills demanded by the employers and the skills possessed by the graduates. The Namibian youth unemployment rate in 2021 stood at 40.44% and a possible investment in youth depends on the vested interest between the shareholders and the executive management of the mining companies. The economic condition of the Namibian youth is described as YO1 "very poor and in serious need of intervention" and further described by another interviewee ED1 and YO2 that "poverty can disproportionately and adversely affect the mental health of the youth". The unemployment rate among the youth is described by MC1 as very high "the youth in Namibia are struggling to find job opportunities and the unemployment rate is very high".

4.2 Programs Initiated Mining Companies Towards Youth Capacity Development

The following tables will illustrate the findings of the initiatives and programs attempted by mining companies towards capacity development of the youth, indicating the number of youths that benefited and the value of the programs including the sustainability of such (Table 2):

According to the information on their publication B2Gold mining company and the respondent MM1, the method it uses to engage the community on CSR is based on a consultative process to consolidate all efforts in identify, select, and implement the projects. While B2Gold mining company is one of the few companies that clearly publish their CSR programs and initiative through published information about the specific programs and initiatives done in its communities, the information lacks certain specifics. The information lacks details on how certain procedures were followed to get to certain decisions which would allow provision of particular programs. According to MM1 and MM3 indicated that the information does not specify the value of the projects due to confidentiality issues. Furthermore, B2Gold mining company does not clearly indicate information concerning the sustainability of each initiative. The information does not indicate the effectiveness of the efforts towards youth capacity development (in particular) nor does it indicate the metrics that was used to measure the particular success of the programs or initiatives (Table 3).

Table 2. Youth initiatives in B2Gold mining company

Programs or Initiatives	Description	#Youth benefited	Value USD/NAD
Youth empowerment in partnership with	A program designed to build the capacity of and create opportunities for young people.	175 youth through community outreach. 55 youth through workshops and boot camps. 18 business ideas.	Not specified
Basic education initiatives	Primary school construction at Ombili—Otjiwarongo	500 pupils 18 staff members	Not specified

Table 3. Youth initiatives at deep yellow limited mining company

Programs/Initiatives	Description	# Youth benefited	Amount USD/NAD
Early childhood development 2020	Mondesa youth opportunities	120 learners, ranging from grades 4 to 8,	N$100,000
Children with handicap action Namibia 2020	Down's syndrome children in Swakopmund	20 handicapped children 3 to 12 years of age.	N$35,000
Hands of Hope	COVID-19 aid initiatives.	100 food for families #500	N$91,000
Kindergarten	Kindergarten resettlement (DRC)	# 64 (3 and 6 years old's).	Sanitizers for kindergarten

Table 4. Youth initiatives in paladin energy limited mining company

Programs/ Initiatives	Description	# Youth benefited	Amount USD/NAD
None identified	O	None identified	0

Deep yellow limited while it has several programs and initiatives, the programs are for children below 12 years. While those programs still are investment in young children and the values of the programs were indicated, the information did not indicate how the process of identifying the programs was done also the mining company does not indicate the sustainability and effectiveness of the initiatives (Table 4).

While Paladin Energy Limited indicate their CSR initiatives on their website, information concerning the initiatives that directly benefited the youth is not found. Though programs are done, in some few incidences, though, some projects were initiated by the recipient communities. The top-down initiative was generally the main method of choosing a project which were identified by all companies as community giving (Eicken et al., 2021).

4.3 Government Initiatives Towards Youth Empowerment

While the youth attest to the fact that the government "recognized the importance of youth capacity development" according to YO2, CM3 suggested that there be "programs such as youth credit schemes which the government can employ to mitigate the issue". While government has implemented initiatives to address youth unemployment like vocational training programs, entrepreneurship, has promoted entrepreneurship through various initiatives, including business development programs, funding schemes, and mentorship opportunities which still has not addressed the challenges of capacity development of the Namibian youth.

4.4 Challenges in Youth Capacity Development

The study established that youth have challenges such as overcrowded classrooms as they seek to acquire quality education. While there is overcrowded classrooms, CM2 "there is also limited resources and a mismatch between skills acquired and market demands". This could be attributed to a lack of career guidance which can provide a clear guidance of relevant skill required and the market demands. However, according to MM2, challenges such as "limited access to finance, inadequate business support services, and regulatory barriers persist" MC2 echoed that the youth "have even started to resort to crime as a way to survive and support themselves".

5 Recommendations

The paper recommends that the mining companies' initiatives and programs provide detailed information on the procedures followed to execute specific programs, ensuring transparency and clarity in their implementation; highlighting the financial and non-financial resources invested in the initiatives to assess their overall impact; establish metrics and measurement tools to assess the success of the programs, enabling a systematic evaluation of outcomes and impact. Engage with relevant stakeholders, including government agencies, educational institutions, and youth organizations, to ensure alignment of initiatives with broader national development goals and youth needs. Implement monitoring and evaluation frameworks to track progress, identify challenges, and make informed adjustments to the programs as needed. Provide regular reporting on the outcomes and impact of the initiatives, demonstrating accountability and transparency to stakeholders. Seek partnerships and collaborations with existing youth development organizations and institutions to leverage resources, expertise, and networks for enhanced program outcomes. Continuously assess and adapt programs based on feedback from youth participants and beneficiaries, incorporating their voices and needs into program design and implementation. By addressing these recommendations, mining companies can enhance the effectiveness, transparency, and sustainability of their initiatives, ultimately contributing to the holistic capacity development of the youth in Namibia.

In conclusion, an investment in youth depends on the vested interest between the shareholders and the executive management of the mining companies. Mining companies can invest in education initiatives, according to Smith et al. (2020) that focus on developing the skills and knowledge of young people in the mining industry. This is reiterated by Mehahad and Bounar (2020) that it can include initiatives such as funding research projects, supporting educational institutions, and investing in educational technology. By addressing these recommendations, mining companies can enhance the effectiveness, transparency, and sustainability of their initiatives, ultimately contributing to the holistic capacity development of the youth in Namibia.

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Determinants of Tax Compliance in the Informal Sector: The Intentions of TIN and Non-TIN Registered Taxpayers

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Abstract Studies have relied on the extended version of the Theory of Planned Behaviour (ETPB) in predicting the compliance intentions of individuals. However, few papers have examined the joint effect of the ETPB variables and other psycho-social factors in explaining the tax compliance intentions among individuals (i.e. persons with tax identification numbers (TIN) and those without tax identification numbers) in the informal sector. We examined the effect of ETPB variables including trust, perceived tax complexity, and intervention strategies on the compliance intentions of TIN registered and Non—TIN registered taxpayers. Employing cross-sectional data from a survey of micro and small self-employed individuals from the Ghanaian informal sector, the partial least square structural equation modelling technique was used to analyse the data. We find that individuals without TIN have high intentions to be tax compliant compared to those with TIN. Policymakers would have to further strategize in knowing the reasons accounting for high compliance intention among Non-TIN taxpayers beyond the intended purpose of the TIN that is supposed to make TIN registered taxpayers more responsible

Keywords Tax compliance · Tax non-compliance · Tax identification number (TIN) · TIN registered taxpayers · Non-TIN registered taxpayers · Ghanaian informal sector · Theory of planned behaviour (ETPB)

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1 Introduction

The problem of tax compliance is an evergreen issue, which is as old as tax itself as no one enjoys paying taxes (Yin et al., 2016; Okpeyo et al., 2019). Finding solutions to the problem of tax non-compliance has been a huge challenge generally faced by governments and tax authorities especially in developing countries (Chepkurui et al., 2014). Earlier studies have established that taxes are the main fuel on which a nation's infrastructural development and public service delivery machinery by governments is efficiently sustained (Owusu et al., 2020; Youde & Lim, 2019). Despite the fact that the key role of taxes to the economy cannot be over emphasized, there is a huge tax gap in the annual revenue target for most central governments owing to a low level of global voluntary compliance at the individual and corporate levels.

The large informal sector and lack of proper systems and structures to enforce tax laws in developing countries like Ghana have negatively resulted in widespread non-compliance of tax by taxpayers over the years and hence, low revenue collections by tax authorities (Aryee, 2007; Okpeyo et al., 2019; Amponsah et al., 2019). Convincing taxpayers to voluntarily pay taxes was always cumbersome, and this often creates an adverse impact on the economy (James & Alley, 2004; Chepkurui et al., 2014). In developing countries, the alarming level of public expenditure that is constantly highlighted in the annual budget of governments are partly accounted for by growth in public sector wage bill and enormous pressure (Taing & Chang, 2020). Ensuring voluntary tax compliance has therefore become a priority in developing countries as most of these countries continue to struggle in dealing with the consistent shortfall in annual revenue targets to meet the rising public expenditure.

Defined as a compulsory, unrequited payment to the general government (OECD, 2019), benefits provided by governments to taxpayers are not in proportion to the payments made by taxpayers. This means there is a redistribution of these payments across households for it to qualify as tax. Hence, a very prudent public policy objective to mitigate the tax gap in contemporary times by governments is to find ways of promoting tax compliance culture among taxpayers. Given the cost of ensuring that taxpayers comply with tax as a major hindrance in ensuring good tax compliance behaviour from taxpayers (Bird & Zolt, 2005; Owusu et al., 2020), the issue of trust is very key as the assessment and payment of taxes by small and micro taxpayers in Ghana is done from a provisional perspective. This approach has placed responsibility on the tax authorities thereby incurring the cost of determining each taxpayer's liability and collecting them. In essence, tax authorities inform taxpayers how much tax liability they owe based on the tax authority's own assessment which could be in excess or below the taxpayer's own assessment. The shortcoming of this policy is that more people will not voluntarily comply with their tax obligations mostly when the perceived level of enforcement remain quite low.

The problem of tax non-compliance which remains an albatross especially on the neck of most developing countries like Ghana need to be addressed. In most jurisdictions, the issues that affect tax compliance among the citizenry seem similar as tax authorities find it difficult in convincing taxpayers to comply with the tax laws in the country which could be out of the taxpayer's ignorance or willful intent. Policies to enhance taxpayer services and encourage voluntary tax compliance in many developing countries have been swiftly implemented as a way of minimizing the level of tax non-compliance (OECD, 2019; Taing & Chang, 2020). Kamleitner et al. (2012) argue that research and policy makers generally perceive small and micro taxpayers as non-compliant to tax obligations, even though it remains a fact that some do comply with the tax laws. Small and micro entities in the informal sector who comply with tax laws are driven by some behavioural reasons or factors which are also instigated by other influential factors. The main question, therefore, is what factors influence these entities to voluntarily comply with their tax obligations.

Numerous studies have been conducted on predictors of tax compliance or non-compliance intention from a behavioural perspective in different jurisdictions relying on the variables of the Extended Theory of Planned Behaviour (Alleyne & Harris, 2017; Mbilla et al., 2018; Owusu et al., 2020; Enachescu et al., 2019). Again, other strands of literature have investigated the taxpaying behaviour of small and micro entities in the informal sector (Terkper, 2003; Atuguba, 2006; Otieku, 1992; Appah & Wosowei, 2016) as well as trust and tax compliance (Ali & Ahmad, 2014; Ya'u & Saad, 2018). In the Ghanaian context of provisional tax assessment of individual taxpayers, trust in the tax system and authority is very crucial in promoting voluntary tax compliance through a synergistic tax environment. Thus, due to the trust between a taxpayer and the tax authority, this synergistic environment asserts a mutual trust between the two parties (that is, tax authority and taxpayer) irrespective of who does the tax assessment. Trust in the authority and system relates to the general perception by a social group or individual that the tax authorities are working beneficially and generously for the common good (Kirchler & Wahl, 2010).

The mixed findings in previous studies have called for further investigation. Unlike the empirical work of Alleyne and Harris (2017) and Owusu et al. (2020) however, we investigate the effect of perceived tax complexity on tax compliance as an addition to the Extended Theory of Planned Behaviour (attitude, subjective norms, perceived behavioural control and moral obligation) on an individual's willingness to comply with tax payment responsibility. This study, therefore, examines the effect of trust, attitude, subjective norms, perceived behavioural control, moral obligation, tax complexity and tax compliance intention among TIN and Non-TIN registered MSMES in the informal sector. Aside from the newness of this study and the contextual focus of prior studies on developing countries, the findings of this study present a policy direction and novel strategies that are very important in bridging the revenue gap in developing countries.

This paper continues with four other parts in addition to this introduction. The second section examines the concept of tax compliance, reviews prior studies on trust, and presents a development of the study hypotheses. The third section explores the method used to conduct the research, highlighting how data was collected and the analysis thereof. Section four presents the results of the study and discussion of the results. The final section draws conclusions and suggest some important areas for future research.

2 Literature Review

2.1 Concept of Tax Compliance

The issue of low voluntary tax compliance has a huge downturn on all nations. Nations all over the world struggle to mobilize the required amount of revenue from the informal sector, especially the self-employed in order to provide relevant public services (Mbilla et al., 2018; Rosid et al., 2018; Augustine & Enyi, 2020). In effect, tax non-compliance involves the reduction of tax required by taking part in false dealings to shun tax, engaging in all forms of imaginable genuine tax deduction by means of delay schemes and enticements that constitute evasion or avoidance (Jones & Rhoades-Catananch, 2010). Tax compliance is the willingness of individuals to act in accordance to both the spirit and the letter of the tax law and administration without the application of enforcement activity but through the taxpayers' positive reciprocity (James & Alley, 2002; Gangl et al., 2015). Similarly, voluntary tax compliance is defined as the willingness and passion by the taxpayer to comply on his or her own with the relevant tax laws, rules and regulations of the tax authority due to the level of trust and cooperation existing between the taxpayer and tax authority (Kirchler, 2009; Sitardja & Dwimulyani, 2016).

Failure by the taxpayer to follow the tax provisions suggest a person may be committing an act of non-compliance (Kirchler, 2009) and hence, complete compliance may require positive actions on the part of the taxpayer to discharge his or her legal and civil duties in full. It may be that taxpayers innocently fail to meet their tax obligations because they fail to complete their tax returns correctly or are unaware of or misunderstand various provisions of the tax system. Notwithstanding, non-compliance is not only an intentional violation but also involves violation in terms of ignorance. Various reasons have been attributed to the high level of non-compliance to taxes. For instance, lack of transparency, high level of complexity, lack of trust in the tax system and authority, inequality in the tax burden and ambiguity of the tax law have been mentioned as factors accounting for tax non-compliance (Atuguba, 2006; Saad, 2014; Oladipupo & Obazee, 2016).

The high prevalence of non-compliance especially tax dodging is due to the lack of a mechanism in place to collect taxes and the widespread opinion that paying taxes is unreciprocated and thus the government does not deserve a portion of a worker's income (McGee, 1999). In addition, ethical stands, culture and religiosity have been cited by other studies (Atuguba, 2006; Nsor-Mballa, 2015; Owusu et al., 2021). Though, it has been argued that punishment and deterrence can influence tax compliance behaviour (Castro & Scartascini, 2015), personal standards (attitude, emotions and trust) have also been hyped as various predictors influencing individual taxpayers willful behaviour towards tax compliance and effective tax administration (Alon & Hageman, 2013; Gurama, 2015; Alleyne & Harris, 2017; Enachescu et al., 2019). Social norms may account for tax behaviour when the desire to evade taxes decreases and the majority of the citizenry comply with taxes (Hashimzade et al., 2013). On the contrary, the likelihood of a high level of default behaviour when the country's deviation rate is high. Accordingly, numerous factors can account for people's tax compliance or non-compliance behaviour.

Measuring the actual compliance behaviour of people can be very tedious due to difficulty in identifying and assessing actual defaulters. The reluctance of giving credible information with regards to unethical behaviour such as tax non-compliance makes it almost impossible to evaluate actual compliance behaviour (Abdul-Razak & Adefula, 2013; Gurama, 2015). Therefore, researchers have resorted to using intentions to involve in a wrongful behaviour as a suitable proxy for actual wrongful behaviour (Mbilla et al., 2018; Owusu et al., 2020).

2.2 Intentions to Engage in Tax Compliance

The driving forces that affect a person's behaviour are contained in the person's intention. Intention constitutes the extent of mindful effort and motivational mechanism that would inform a person's performance of a behaviour (Ajzen, 1991). Ajzen (1991) asserts that intention gives a signal of people's consistency and desire to pursue a behaviour as well as the amount of planned effort applicable in order to perform the behaviour. Again, Ajzen (1991) maintain that people's intention to carry out a specific behaviour is predisposed by an attitudinal standard in the direction of the behaviour (the extent of people's assessment of favourableness or unfavourableness of a behaviour); subjective norms (apparent social burden from others to either perform or not to perform a behaviour); perceived behavioural control (supposed comfort or difficulty in the behaviour occurrence) and moral obligation (the perception of right or wrong).

2.3 The Theoretical Framework: Extended Theory of Planned Behaviour (ETPB)

The Theory of Planned Behaviour brings to bear attitude, subjective norms and perceived behavioural control as the factors that influence individual's behavioural intentions, which have the potential of ultimately affecting the performance of real behaviour (Ajzen, 1991). Attitude is generally perceived as an individual's assessment of a behaviour to either be favourable or unfavourable (Ajzen, 1991). Subjective norms look at the extent to which a person is of the opinion that his or her decision can be influenced by the views of other relevant people. Also, perceived behavioural control explains the level of control (difficulty or opportunity) that a person has regarding his or her capability to be involved in a specific behaviour

Extending the TPB, Beck and Ajzen (1991) added 'moral obligation' as another variable to the TPB framework which describe a person's view about moral uprightness (good) or otherwise (bad) of performing a certain behaviour. Subsequent to the

TPB's comprehensiveness, the study relies on the ETPB to investigate the factors that influence self-employed individuals' tax compliance intention. Specifically, the study examines whether sole proprietors' intention on tax compliance (attitude), their opinion of tax compliance endorsement by prominent stakeholders (subjective norms), their perceived ability to engage in compliance (perceived behavioural control), their perception of moral goodness or otherwise of involving in tax compliance (moral obligation), and their perceived difficulty in being tax compliant (perceived tax complexity) are good predictors of individuals tax compliance intention. Thus, the hypothesis is that:

H1: Attitude has a positive effect on tax compliance intention
H2: Subjective Norms has a positive association with tax compliance intention
H3: Perceived Behavioural Control has a positive relationship with tax compliance intention
H4: Moral Obligation has a positive effect on tax compliance intention
H5: Perceived Tax Complexity is negatively associated with tax compliance intention

2.4 Trust and Tax Compliance Intention

The reciprocity mystery about payment of taxes is centred on trust between the tax authority and taxpayer (Gangl et al., 2015), because tax compliance is perceived as a multi-faceted measure. Defined as the apparent susceptibility of persons due to the dealings of others behaviour based on their ability, kindness, and honesty (Guo et al., 2012). Trust in the authority and tax system relates to the general perception by a social group or individual that the tax authorities are working beneficially and generously for the common good (Kirchler & Wahl, 2010). From extant literature, trust in the authority and system positively relates to tax compliance (Torgler, 2003; Torgler & Schneider, 2007; Ya'u & Saad, 2018). Kirchler (2009) noted that voluntary tax compliance as well as trust in the government and system for individual, the group, or society will increase when tax authorities treat taxpayers in a responsible and respectful manner.

As a result, a synergistic tax environment is created due to the trust between a taxpayer and the tax authority, and this synergistic environment asserts a mutual trust between the two parties. The mutual relationship and respect accorded the individuals by tax authorities will influence their loyalty and enthusiasm for compliance, and in turn, pay their taxes honestly in fulfillment of a psychological contract between the two parties (Ya'u & Saad, 2018). Empirically, the significant role of trust in the tax system and authority in promoting tax compliance behaviour cannot be over emphasised (Lavoie, 2008), owing to lack of regular direct contact between the tax authority and taxpayers (Chai et al., 2011; Prichard, 2016). Robbins (2016) identified five key holistic dimensions of trust to include integrity (truthfulness and honesty), competency (interpersonal and technical skills and knowledge of a particular leader), consistency (individual predictability, reliability and good judgment in tackling a situation), loyalty (faithfulness or devotion to someone and advocates for their success) and openness (the ability of a person or leader to give you the whole truth). Thus, we hypothesize that:

H6: Trust positively relates to intention to engage in tax compliance.

3 Methodology

3.1 Research Design, Instrument and Data Collection

The study adopted the quantitative approach specifically, a survey method with questionnaires as the means of data collection. The questionnaires comprised two different sections. The first section required the background information about the respondents. The second section focused on the specific questions used to measure respondents' intentions to engage in tax compliance. Drawing on the ETPB, four constructs: attitude, subjective norms, perceived behavioural control and moral obligation as well as PTC are relevant predictors of tax compliance intention. Indicators adapted from Alleyne and Harris (2017) measured these constructs. In addition, three other constructs: PTC, ABIS and trust were examined as predictors of tax compliance intention. The indicators adapted for their measurement were; PTC (Saad, 2014), ABIS (Langham et al., 2012) and trust (Ya'u & Saad, 2018). All the indicators of the study constructs were measured on a Likert scale with anchors ranging from one to seven, details of which are provided in Table 2**.** Out of the 750 questionnaires distributed, 746 were collected and 725 were fully completed and used for the analysis.

3.2 Data Analysis Procedures

The data was analyzed descriptively using Statistical Package for Social Sciences (SPSS)**.** The normal diagnostic test of reliability and validity was conducted on the research instrument. The predicted hypotheses of the study were tested using structural equation modelling (SEM). The SEM-based techniques help researchers to test and validate relationships as well as evaluate measurement models and structural paths that comprise latent constructs made up of multiple indicators (Astrachan et al., 2014). The Partial Least Square based SEM (PLS-SEM) technique was adopted using SmartPLS 3.0 software for the analysis of the structural model.

Table 1 Demographic characteristics of respondents

Variable	Groups	Frequency (n = 725)	Percent
Gender	Male	401	55.3
	Female	324	44.7
Age	30 and below	204	28.1
	31–35	139	19.2
	36–40	158	21.8
	41 and above	224	30.9
Educational level	Non-formal	76	10.5
	Basic education	210	29.0
	Secondary education	208	28.7
	Tertiary	231	31.9
Number of years in business	Below 4 years	214	29.5
	4–5 years	138	19.0
	6–7 years	138	19.0
	Over 7 years	235	32.4
Nature of business	Agric-related	144	19.9
	Commerce	381	52.6
	Service	152	21.0
	Others	48	6.6
Business registered with assembly or GRA for tax purposes	Yes	375	51.7
	No	350	48.3
Has a tax identification number (TIN)	Yes	323	44.6
	No	402	55.4

4 Results and Discussion

4.1 Profile of Respondents

The descriptive statistics of the respondents is presented in Table 1. Males form the majority of the study sample accounting for 55.3%, while commerce was the activity most engaged in with a share of 52.7% of the respondents. A cumulative majority (69.1%) of the respondents were not above 40 years. Similarly, 57.7% of the respondents received education from primary to secondary level while 31.9% received tertiary education with only 10.5% receiving no formal education at all. This suggests the respondents at least have a fair idea about tax compliance.

In addition, 32.4% (majority) of the respondents have been in business for more than 7 years whereas other respondents have a business duration of less than 4 years; 4–5 years and 6–7 years, indicating that a respondent might have evaded or avoided tax for at least once. More of the respondents have registered with either the GRA or MMDA's for tax purposes. However, about 55.4% of the respondents have no Tax

Identification Numbers (TIN), suggesting that, the aim of bringing more individuals into the tax bracket through the TIN system by ACT 632 (2002), has not gained the needed grounds for promoting tax compliance.

4.2 Descriptive Statistics on Constructs

In this section, the mean scores, and standard deviations of the respondents' opinions on the precise indicators used to measure the key constructs of the study are reported. Respectively, the mean score of each indicator under the constructs: attitude, subjective norm, perceived behavioural control, moral obligation, PTC, ABIS and trust indicate the level of agreement or disagreement to each statement. Results from this analysis as given in Table 2 show an overall mean of 5.22 for the construct 'attitude towards tax compliance intention'. This value indicates that the respondents strongly agree with the statements that explain tax compliance to be good, pleasant, and attractive. This outcome thus indicates that self-employed individuals sampled have a favourable attitude towards tax compliance.

An overall mean of 4.42 recorded by the construct 'subjective norm' proves that the respondents were of the strong opinion that other prominent people in their lives will approve a tax compliance intention. Similarly, perceived behavioural control had an overall mean of 4.02 which demonstrates the level of indecision self-employed individuals have over their intention to engage in tax compliance. Again, the construct 'moral obligation' had an overall mean of 4.76 indicating that the respondents strongly consider tax compliance to be morally good. Consequently, 'intention to engage in tax compliance' which is the variable of interest recorded an overall mean of 4.34 suggesting that the respondents had a very strong intention to engage in tax compliance.

Furthermore, the construct 'perceived tax complexity' had an overall mean of 4.63 suggesting that the complex nature of the tax system make the respondents intention to engage in tax compliance very low. Finally, the construct 'trust' had an overall mean of 3.41; an indication that the respondents are of the strong opinion that the perceived dishonesty in the authority and the tax system will lower their intention to engage in tax compliance. The mean scores of most of the indicators were above the 3.5 mid-point value, a clear indication that the respondents believe it is good to voluntarily engage in tax compliance. By implication, the respondents demonstrate that noncompliance is unlawful and believe that though unreciprocated, individuals have a civic responsibility to pay taxes as a way of contributing to the welfare of others. Thus, voluntary compliance will enable the state to function properly. Nevertheless, most of the respondents somehow agree that noncompliance is justified if to a large extent the tax rates are too high (mean = 5.55) and the terms in the individual income tax return forms are difficult to understand (mean = 4.65).

Table 2 Descriptive statistics on constructs

Variables	Mean	Std. Deviation
Attitude		
I will be disturbed if I am unable to correctly state my taxes	4.95	2.182
I will feel guilty if I cheat on my taxes	5.14	2.217
I will feel pleased if I pay less taxes	5.30	2.129
The likelihood of being audited by the GRA is low	5.24	2.119
It will be financially beneficial for me to pay less taxes	5.44	2.064
I find the concept of tax compliance very relevant	5.26	2.097
Overall mean	**5.22**	**2.13**
Subjective Norms		
My family and peers will think that I should pay less taxes	5.00	2.317
My family and peers will think that I should only pay the correct taxes	5.15	2.017
Most people who are important to me will look down on me if I cheat on taxes	4.69	2.303
Most people I know will approve of me cheating on taxes	3.06	2.446
My role models and co-workers will think filing my tax returns should exclude some income sources.	4.25	2.389
If I cheated on my taxes, most people who are important to me will disapprove	4.39	2.521
Overall mean	**4.42**	**2.33**
Perceived Behavioural Control		
With my tax knowledge, skills and resources, it will be very easy for me to pay less taxes	3.55	2.244
Due to my limited tax knowledge, skills and resources, it is hard for me to pay less taxes	5.01	2.224
I will successfully state less taxes in my tax return form if I wanted to	4.11	2.406
With my tax knowledge, skills and resources, I will have no difficulty in stating less taxes successfully	3.76	2.385
There are no barriers that will prevent me from stating less taxes successfully	3.68	2.495
Overall mean	**4.02**	**2.35**
Moral Obligation		
I think it would be morally wrong to engage in tax non-compliance	5.64	2.156
I will not feel guilty if I cheated on taxes	3.44	2.556
Cheating on taxes goes against my principles	4.69	2.582
It will be morally wrong for me to cheat on taxes	5.25	2.419
Overall mean	**4.76**	**2.43**
Tax Compliance Intention		
I will report my income fully, including all other sources	3.90	2.443
I will not attempt to cheat by omitting to report any extra income in my tax return form	3.86	2.366
I will declare extra income which is not earned from my regular income source	4.18	2.608
I will not fail to comply with the tax laws in future	5.43	2.137

(continued)

Table 2 (continued)

Variables	Mean	Std. Deviation
Overall mean	**4.34**	**2.39**
Perceived Tax Complexity		
I think the terms used in tax publications (e.g. GRA guide books) and in tax return forms are difficult for people like me to understand	4.65	2.450
The sentences and wording in the individual income tax return guide looks lengthy and not user-friendly	5.20	1.914
The rules related to individual income tax are clear	4.54	2.186
Most of the time I need to refer to others for assistance in dealing with tax matters	4.61	2.348
I will have a problem in completing and filing the tax return form(s), if they are required	4.11	2.322
I will find it tedious to maintain all my relevant records for the whole year for tax purposes (if I must complete the tax return form(s))	5.10	2.012
Most of the tax liability am given to pay after assessment made by GRA looks overstated for me to pay	5.32	1.908
I do not have to make a lot of effort to understand the explanations given in GRA guide books and other similar explanatory material	3.49	2.427
Overall mean	**4.63**	**2.20**
Trust		
Current graduated tax rates are far too high	5.55	1.979
Generally, the income tax system in Ghana is fair	3.49	2.450
Overall, the burden of tax in Ghanaian tax system has been well distributed	2.87	2.053
Tax revenue is wisely spent by the government on project and infrastructure that are beneficial to taxpayer	2.67	2.091
The taxes I must pay are not too high considering the social benefits provided by the government	2.39	1.807
GRA cares about the concerns of taxpayers when a provisional assessment is made.	3.34	2.420
GRA trust the assessment made by taxpayers themselves	2.95	2.150
GRA considers the views of average citizens on new laws over changes to their systems with much flexibility	3.35	2.317
I am satisfied with assessment and collection of tax process made by GRA	3.75	2.427
GRA gives good cooperation when taxpayers need information about tax laws	3.16	2.258
Overall, GRA is very efficient in carrying their duties and affairs with taxpayers	3.17	2.224
In my opinion, GRA can check the correctness of all the information reported in tax form submitted by taxpayers	4.35	2.495
Overall mean	**3.41**	**2.22**

4.3 Validity and Reliability

Tests for reliability and validity were conducted to determine the suitability for including the constructs in the structural model analysis. Reliability explains the assessment of the consistency of results produced using a research instrument (Golafshani, 2003). The Cronbach alpha (CA) and Fornell and Larcker measure of composite reliability (CR) scores were used to measure the internal consistency of each construct. Results from Tables 3 and 4 demonstrate that the CA and CR score of each construct is above 0.7, which falls within the recommended threshold (Fornell & Larcker, 1981; Hair et al., 2017) except CA for attitude, moral obligation, and subjective norms. However, CR is superior to CA, which assumes that all indicators should weigh equally while CR assumption uses the loadings obtained from the model itself (Hair et al., 2012a, b) and hence, all constructs are reliable. Also, convergent and discriminant validity of the instruments were checked as a test for validity. As shown in Tables 3 and 4, the AVEs of all the constructs met the acceptable threshold of 0.5 and above (Hair et al., 2017). Again, the Fornell and Larcker criterion of discriminant validity was used to show how uncorrelated and distinct the constructs are. For discriminant validity to be assured, the square root of the AVE scores of the factors should be larger than the cross-correlations between the factors (Fornell & Larcker, 1981). The results of this test as presented in Table 5 and 6 suggest discriminant validity is assures as the AVE scores for the factors were greater than the squared correlations of the factors.

Table 3 Validity and reliability test (With TIN)

Construct	CA	CR	E
Attitude	0.54	0.76	0.52
Tax compliance intention	0.77	0.90	0.81
Moral obligation	0.59	0.74	0.50
Perceived Behavioural control	0.72	0.82	0.54
Perceived tax complexity	0.63	0.84	0.73
Subjective norms	0.68	0.86	0.76
Trust	0.82	0.87	0.53

Table 4 Validity and reliability test (Without TIN)

Construct	CA	CR	AVE
Attitude	0.79	0.88	0.71
Tax compliance intention	0.73	0.85	0.65
Moral obligation	0.73	0.85	0.65
Perceived Behavioural control	0.63	0.79	0.55
Perceived tax complexity	0.78	0.85	0.52
Subjective norms	0.50	0.80	0.67
Trust	0.80	0.86	0.51

Table 5 Discriminant validity (Fornell and Larcker Criterion) (With TIN)

Constructs	ATT	MO	PBC	PTC	SN	TCI	TR
ATT	**0.724**						
MO	0.500	**0.707**					
PBC	−0.454	−0.399	**0.737**				
PTC	0.265	0.236	−0.462	**0.853**			
SN	0.653	0.480	−0.419	0.308	**0.869**		
TCI	0.478	0.468	−0.331	0.330	0.536	**0.901**	
Trust	−0.388	−0.151	0.571	−0.453	−0.385	−0.216	**0.725**

Table 6 Discriminant validity (Fornell and Larcker Criterion) (Without TIN)

Constructs	A	TCI	MO	PBC	SN	T	TC
A	**0.841**						
TCI	0.262	**0.808**					
MO	0.376	0.608	**0.807**				
PBC	0.135	0.423	0.239	**0.742**			
SN	−0.246	−0.697	−0.562	−0.215	**0.816**		
T	0.140	0.611	0.495	0.484	−0.585	**0.716**	
TC	0.098	−0.484	−0.329	−0.229	0.510	−0.450	**0.723**

Table 7 Multicollinearity of constructs, R2 and Q2 (With TIN)

Constructs	VIF
Attitude	2.042
Moral obligation	1.604
Perceived Behavioural control	1.916
Perceived tax complexity	1.409
Subjective norms	1.966
Trust	1.741
R^2 (0.386) Q^2 (0.26)	

4.4 Structural Model Analysis

Upon establishing the suitability of the constructs using the reliability and validity tests, the study proceeded to assess the structural model. Prior to testing the hypotheses of the study, a test for multicollinearity was conducted using the variance inflation factor (VIF). The test results suggest issues of collinearity will not influence the structural model negatively as the VIF scores were below the maximum threshold of less than 3, as shown in Table 7 and 8 (Hair et al., 2017). Again, using the Herman's single factor score test to check for common method bias, test result of 12.24% suggest our model has no common method bias problem as the Herman's single factor score is within the 50% acceptable threshold (Podsakoff et al., 2012). The proposed hypotheses were finally tested using the Bootstrapping procedures of Smart-PLS. Figures 1 and 2 presents the structural models for the direct relationships

Table 8 Multicollinearity of constructs R2 and Q2 (Without TIN)

Constructs	VIF
Attitude	1.299
Moral obligation	1.761
Perceived Behavioural control	1.361
Perceived tax complexity	1.619
Subjective norms	2.146
Trust	2.118
R^2 (0.633) Q^2 (0.403)	

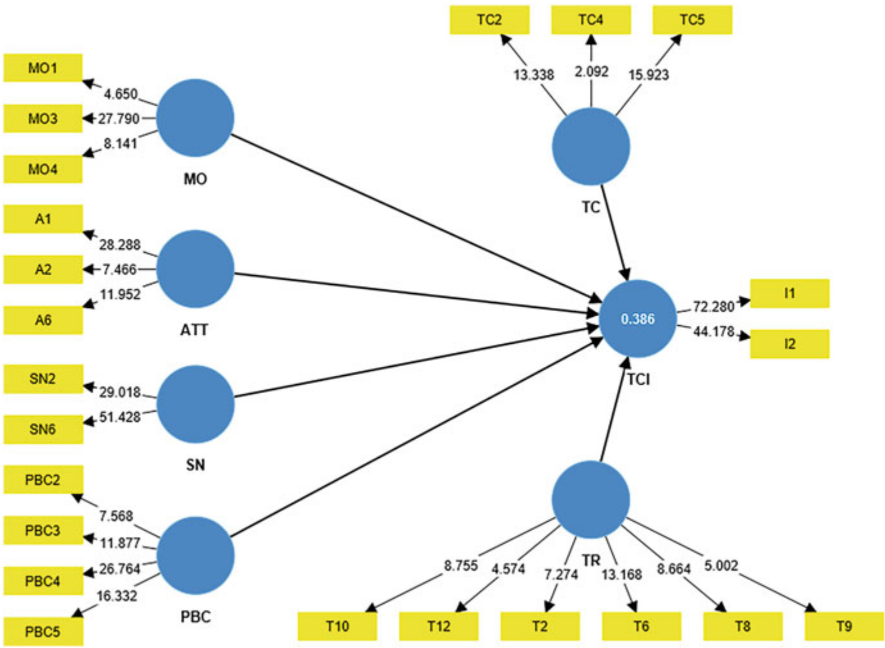

Fig. 1 Structural model for Taxpayers with TIN

between the exogenous and the endogenous constructs based on the PLS algorithm for the analysis of the responses with TIN and without TIN. Based on the structural relationships of the study as shown in Figs. 1 and 2, the coefficient and significance of the paths in the structural models were analysed using bootstrapping procedure. The regression results of the bootstrapping analysis are presented in Tables 9 and 10.

Prior to testing the hypotheses of the study, the coefficient of determination (R^2) was assessed. The exogenous variables of the study, tax compliance intention, recorded R^2 values of 0.386 and 0.633 for the analysis of data of respondents with TIN and those without TIN respectively. Thus, 38.6% of the variations in tax compliance intention is explained by the variables of the study related to respondents with TIN numbers and 63.3% of the variations in tax compliance intention is

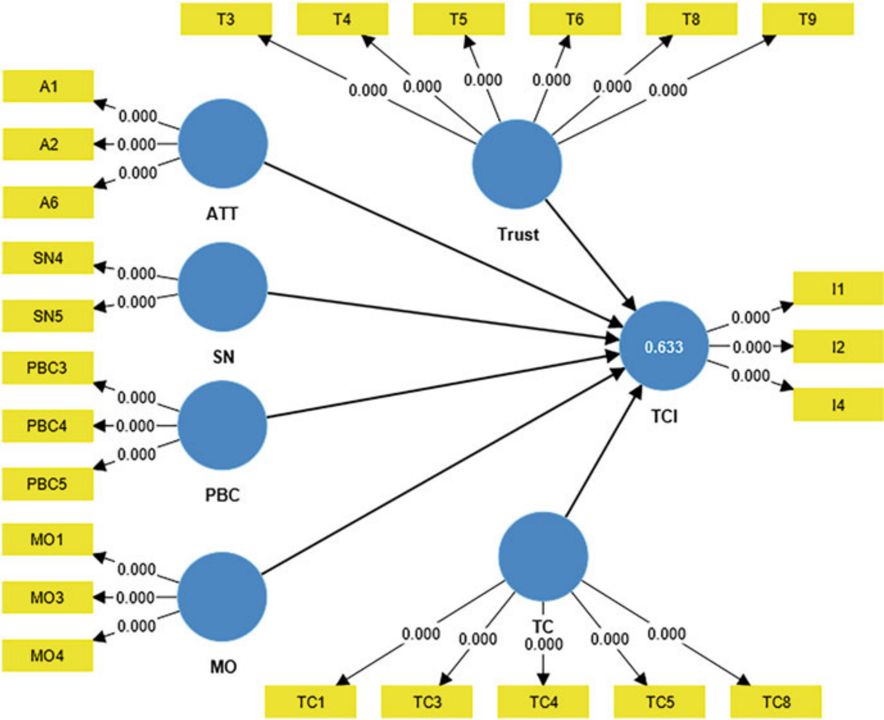

Fig. 2 Structural model for Taxpayers without TIN

Table 9 Hypotheses testing (Direct Relationship) (With TIN)

Hypotheses	Path	Coefficient	P-Values	Results
H1:	AT - > TCI	0.138	0.071	Rejected
H2:	MO - > TCI	0.193	0.007	Accepted
H3:	PBC - > TCI	−0.029	0.692	Rejected
H4:	PTC - > TCI	0.165	0.012	Accepted
H5:	SN - > TCI	0.320	0.000	Accepted
H6:	Trust - > TCI	0.078	0.252	Rejected

Table 10 Hypotheses testing (Direct Relationship) (Without TIN)

Hypotheses	Path	Coefficient	P-Values	Results
H1:	AT - > TCI	0.049	0.218	Rejected
H2:	MO - > TCI	−0.377	0.000	Accepted
H3:	PBC - > TCI	0.199	0.000	Accepted
H4:	PTC - > TCI	0.225	0.006	Accepted
H5:	SN - > TCI	−0.113	0.000	Accepted
H6:	Trust - > TCI	0.111	0.041	Accepted

explained by the variables of the study related to respondents without TIN numbers. An assessment of the predictive relevance of the model was carried out using the blindfolding rules (Hair et al., 2017). Recording Q^2 estimations of 0.403 and 0.26 for the exogenous variable, tax compliance, for the analysis of data of respondents with TIN and those without TIN respectively, suggests that the model has predictive relevance as the values are above the recommended threshold of zero.

4.5 Discussion of Results

The results presented in Table 9 and 10 reveal a positive but insignificant relationship between an individual's attitude and tax compliance behavior, regardless of whether they possess TIN numbers or not. This finding indicates that individuals who hold a favorable attitude towards paying taxes may, to some extent, have intentions to comply with their tax payment obligations, although the impact of attitude alone may not be substantial. According to the Theory of Planned Behavior proposed by Ajzen (1991), attitude is one of the key determinants influencing behavioral intentions. A positive attitude towards a specific behavior is expected to lead to a greater likelihood of engaging in that behavior. However, the relationship between attitude and tax compliance intention in this study seems to be weaker and statistically insignificant. Several factors may contribute to this finding. It is possible that individuals' attitudes alone are not sufficient to overcome other barriers or challenges they may face in complying with tax regulations. Therefore, while a positive attitude towards tax payment is a necessary condition for tax compliance intention, it may not be the sole determinant of actual compliance behavior. This finding is consistent with previous studies (Owusu et al., 2020; Sadress et al., 2019) that have also demonstrated a positive association between attitude and tax compliance behavior.

The relationship between subjective norms and tax compliance intention also yielded a positive and highly significant relationship between the two constructs with regards to individuals with TIN numbers. This finding is an indication that the adherence of individuals with TIN numbers to tax regulations is significantly influenced by the pressure and influence exerted by influential individuals such as role models, family members, friends, and respected figures in society. The negative relationship between subjective norms and tax compliance intention among individuals who have not registered with the tax authorities is not entirely unexpected. Since these individuals have already defied the government's aim of bringing more individuals into the tax bracket by not registering, they are not likely to be influenced by the opinions of respected individuals in society with regards to being tax compliant. In this context, the absence of a positive relationship between subjective norms and tax compliance intention implies that external pressures and influences do not play a significant role in shaping their intention to comply with tax regulations.

The results suggest that efforts to promote tax compliance should not only focus on legal enforcement and penalties but also emphasize the importance of positive role models and influential individuals who can promote a culture of tax compliance within the society. This argument is supported by extant studies in the area of taxation (Jimenez & Iyer, 2016; Owusu et al., 2020), which demonstrate that the tax compliance behavior of individual taxpayers can be shaped by the opinions of important individuals in their lives. Hence, our findings provide empirical support for the argument that subjective norms play a crucial role in predicting tax compliance behavior.

The regression output also shows a negative and statistically insignificant relationship between perceived behavioural control and tax compliance intention for individuals with TIN numbers. This finding suggests that the sense of control individuals perceive over their behaviour may not have a significant influence on their intention to comply with their tax payment obligations, as proposed by Ajzen's Theory of Planned Behavior (1991). This finding contradicts previous studies conducted by Lee and Kozar (2005) and Alleyne and Harris (2017), which concludes that the perceived ease or control an individual has over their actions influences their willingness to pay taxes. The contradiction in findings may be attributed to the context and sample characteristics of the present study which may differ from those of previous research as well as factors such as cultural, economic, and institutional variations which could affect the role of perceived behavioral control in tax compliance intentions.

Surprisingly, the relationship between perceived behavioral control and tax compliance intentions of those without TIN numbers was however positive and statistically significant. The positive relationship between perceived behavioral control and tax compliance intentions amongst those without TIN numbers suggest that enhancing such individuals' sense of control and self-efficacy in relation to tax compliance could be an effective strategy for promoting compliance behavior among those who are currently outside the formal tax system. By providing clear and accessible information about tax regulations, simplifying procedures, and offering support and guidance, tax authorities can help individuals without TIN numbers to perceive a greater level of control over their tax compliance behavior.

The results also demonstrate a positive and highly significant association between moral obligation and tax compliance intentions of the respondents with TIN numbers. This finding is an indication that an individual's sense of personal responsibility towards others in society can have a positive impact on their willingness to comply with tax regulations. Even though moral obligation is not directly linked to any legal requirements, it reflects an individual's beliefs about what is morally right or wrong. Individuals with a strong sense of responsibility towards others are more likely to view tax payment as morally right and, therefore, fulfill their tax payment responsibilities. Empirically, our results align with previous studies (Alleyne & Harris, 2017; Culiberg, 2018) that have concluded that moral obligation influences tax compliance intention. The negative relationship between moral obligation and tax compliance intention among individuals who have not registered with the tax authorities is not surprising as such individuals may already be demonstrating a lack of commitment to contributing to the society by not registering.

The results of our study unexpectedly demonstrate a positive and statistically significant correlation between respondents' perception of tax complexity and their intention to comply with tax obligations. This finding contradicts previous research conducted by Saad (2014) and PWC (2014), which suggest that complex tax laws and administration systems typically discourage tax compliance. This finding may be attributed to several factors. First, individuals' subjective perception of tax complexity may differ from the actual complexity of the tax system. It is possible that individuals who perceive tax regulations as complex also view compliance as an important duty or responsibility, leading to their higher intentions to comply. Another possible explanation could be the presence of external factors influencing this negative relationship. For instance, individuals who perceive tax regulations as complex may also perceive a higher risk of penalties or legal consequences for non-compliance. This heightened risk perception could motivate individuals to have stronger intentions to comply, despite perceiving the tax system as complex.

The relationship between trust and tax compliance also yielded a positive and statistically significant result regardless of the respondents' formal registration within the tax system. This finding suggests that individuals are more motivated to comply with their tax payment responsibilities when they have trust in the system and perceive those in charge of managing state resources as honest and trustworthy. When individuals trust the government or tax authority, they are more likely to perceive tax regulations as fair and legitimate. They believe that their tax contributions will be utilized for the benefit of society and public goods. Consequently, they feel a sense of obligation and responsibility to fulfill their tax obligations, as they view tax compliance as a civic duty (Alemika, 2004). This finding aligns with existing studies conducted by Chai et al. (2011) and Mohseni and Sreenivasan (2014), which emphasize the significance of taxpayers' perception of the government or tax authority as a predictor of tax compliance intention. It underscores the crucial role of trust in shaping individuals' attitudes and behaviors towards tax compliance.

5 Conclusion

Globally, trust has become an issue of importance when it comes to domestic revenue mobilisation because of the government's inability to meet revenue targets. Consequently, many countries, especially developing ones have embarked on several tax reforms on determining the key antecedents to individual's intention to pay taxes. This study contributes to the literature by investigating the effect of 'trust' in government and tax system on tax compliance intention among selected self-employed individuals working in the informal sector. Drawing on the ETPB constructs and perceived tax complexity, we evaluate the tendency of individual's willingness to pay taxes. Based on our expectation and consistent with empirical studies (Ya'u & Saad, 2018; Robbins, 2016; Prichard, 2016; Mohseni & Sreenivasan, 2014), we found that there is positive relationship between two of the constructs, attitude and trust on tax compliance intention. However, it is interesting to note that the relationship between perceived tax complexity and tax compliance intention in our study did not align with our hypothesis and previous empirical studies. Further research is necessary to better understand the underlying mechanisms and contextual factors that contribute to the positive relationship between perceived tax complexity and tax compliance intention. It would be valuable to investigate the specific aspects of tax complexity that individuals perceive as influential and examine how these perceptions interact with other variables in future studies.

Certainly, the findings of this study highlight the mechanisms through which individuals' intention will translate into actual behaviour of filing, reporting and paying taxes without compulsion from tax administrators. The usefulness of the study to the community and government emphasize the need for being a good steward for the benefit of the masses. As a result, the probability of the more 'difficult to tax' self-employed individuals appreciating the need to demonstrate responsible tax compliance behaviour cannot be discounted.

Despite the immeasurable contributions of this study, the findings of this study are limited in some respects. First, this study only indicates factors that influence people's intention to engage in tax compliance and not actual tax compliance behaviour. Also, the respondents engaged had no personal influence on the research instrument but to fit into the pre-defined parameters of which may badly affect the interpretation and generalisation of the of the findings. Whilst using intention as a proxy may be a good predictor of actual tax compliance behaviour, this may not represent true tax compliance behaviour. Therefore, care must be taken in interpreting the findings of the study. Therefore, important avenues for future research are available based on these limitations.

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Determinants of Corporate Governance Quality in Commercial Banks: Evidence from Nigeria

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Abstract The determinants of corporate governance quality have been identified in the empirical literature. However, further evidence has emerged that the variables may complement each other within the framework of contextual variables, resulting in multiple paths to achieving corporate governance quality. Furthermore, the empirical literature has been criticised for using the symmetry and net effect methodology of multiple regression and structural equation modelling against the asymmetry and bundle effect methodology. Therefore, this study examines the determinants of corporate governance quality in the Nigerian banking industry between 2006 and 2021 within the configurational theory, environmental factors of life cycle phases, and firm importance. The study used the panel secondary data obtained from the annual audited financial statements of 11 publicly quoted deposit money banks (commercial banks) on the Nigerian Exchange Group with complete financial information during the period under review. Based on the configurational theory, which is anchored on the tenets of conjunctural causation, equifinality, and causal asymmetry, the study uses fuzzy-set qualitative comparative analysis (fsqca) to achieve the objective of the study. The results show that contrary to the extant literature, five equifinal configurations explain the determinants of corporate governance quality among deposit money banks in Nigeria. The study concludes that corporate governance quality cannot be achieved by a single factor but by a complex combination of factors within the context of life cycle phases. The study has theoretical, methodological, and practical implications for bank management and regulatory authorities.

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1 Introduction

The literature is replete with studies that link the 2007–2009 global financial crises with poor corporate governance practices (Berglof, 2011; Zhou et al., 2021). The substantial evidence points to the fact that non-financial indices such as corporate governance have a critical role in corporate performance (Ammann et al., 2011; Bravo-Urquiza & Moreno-Ureba, 2021; Cucinelli & Soana, 2023). A principal aim of the corporate governance mechanism is the monitoring and controlling function where the managers' interests align with the principals (Freeman & Dmytriyev, 2017). However, further evidence shows that a single measure of corporate governance does not reflect or demonstrate the quality of corporate governance (Almagtome et al., 2020). Corporate governance quality is a multi-dimensional concept transcending a single proxy (Putri & Prasetyo, 2020). Corporate governance quality has been a topical issue among regulators and academics (Redondo & Bilbao, 2018).

One of the strands of the empirical literature focuses on the determinants of firm-level corporate governance quality. Prior studies have relied on firm size, profitability, leverage, growth opportunities, asset tangibility, ownership concentration, and external financing needs to determine firm-level corporate governance quality. For instance, Klapper and Love (2004) identify firm size, asset tangibility, and growth opportunities as determinants of corporate governance quality in emerging economies. In addition, two prior studies (Durnev & Kim, 2005; Leão et al., 2016) identify three firm-level factors of growth opportunities, ownership concentration, and external financing needs as determinants of corporate governance quality in Brazil. In addition, Waweru (2014) identifies size, investment opportunity, and leverage as determinants of corporate governance quality in South Africa. These empirical studies have been underpinned by agency, stakeholder, stewardship, legitimacy, and resource dependency theories.

Despite the increasing discussions on the determinants of firm-level corporate governance quality, three major gaps can be identified. First, the empirical literature has focused on commercial or other authors' indexes suitable to the researchers' home countries' institutional arrangement and structure. These indexes may not have general applicability to all countries. Second, some important variables and contextual factors have been largely omitted as determinants of corporate governance quality. For example, this study argues that product market competition is a key determinant of corporate governance quality, and these determinants should be considered within the contextual factors of life cycle phases and the firm importance. Third, there is the possibility of complementarity among the variables such that the net effect of each determinant of corporate governance quality may not tell the complete story (Mansour et al., 2022). Therefore, while the common theoretical underpinnings are relevant to understanding the determinants of corporate governance quality, they are inadequate in addressing the complementarity among the variables.

Therefore, the study departs from prior studies and extends the body of knowledge on the determinants of corporate governance quality in two key ways. First, the study provides additional variables that can impact corporate governance quality at the firm level. Specifically, the study argues that product market competition is also a factor to consider when assessing corporate governance quality determinants. The study further argues that the determinants of corporate governance quality should be analysed within the context of the firm importance and the life cycle phase in which the firm is located. Second, the study is guided by the configurational theory to determine the complementarity of these variables. The configurational theory explains how causally relevant conditions form a bundle explaining an outcome of interest. The theory transcends the study of "net effect" and moves towards studying the bundle of effects. The study adopts the fuzzy set qualitative comparative analysis (fsQCA) to study the different configurations that can lead to the outcome (Pappas & Woodside, 2021).

This study is conducted within the Nigerian banking industry. Nigeria is a bank-based developing economy and arguably the largest in sub-Saharan Africa. Consequently, the banking sector is subject to diverse regulations from a variety of regulatory authorities, such as the Central Bank of Nigeria (CBN), the Nigeria Deposit Insurance Corporation (NDIC), the Security and Exchange Commission (SEC), and the Financial Reporting Council of Nigeria (FRCN), to drive economic growth and development. As a result, many corporate governance codes have been developed for the banking industry. The codes were meant to institute a quality corporate governance structure suitable for optimal industry performance. However, while there is an extensive study on corporate governance mechanisms in the Nigerian banking industry, there is a shortage of studies on the determinants of corporate governance quality. Furthermore, to the authors' knowledge, studies that have used the configurational theory as the theoretical underpinning for the determinants of corporate governance quality are scarce.

The other sections of the study are as follows: Section 2 details the theoretical and empirical literature, while Sect. 3 analyses the methodological design. Finally, section 4 details the qualitative comparative analysis results and discussion, while Sect. 5 states the conclusion.

2 Review of Literature

2.1 Corporate Governance Quality

Corporate governance quality is a multi-dimensional construct subject to several definitions (Dalton & Dalton, 2011). For example, Rahman and Khatun (2017, p. 60) define corporate governance quality as the "*governance codes, rules, regulations,* *and best practices developed to assess best-and-worst governed firms*." A corporate governance index aims to distinguish between well-governed and poorly governed firms and benchmark the best practices of leading firms. A high-quality corporate governance system enables a firm to attract valuable financing and growth opportunities. According to Bajra and Cadez (2018), corporate governance quality is conceptualised as the quality of its constituent mechanisms of the board of directors, internal audit, and audit committee. The quality of corporate governance is measured using an index or rating (Lazarides & Drimpetas, 2011). The index is a composite measure that integrates selected governance indicators into a single measure, which is then applied as a proxy for corporate governance quality (Nerantzidis, 2018).

The index can be divided into commercial and non-commercial (author-developed) indices. Some of the popular commercial corporate governance indexes include the Credit Lyonnais Securities Asia (CLSA), FTSE International Shareholders Services (ISS) corporate governance index (2004), the IFC scorecard of corporate governance standards, and the Standard and Poor's Governance, Management, Accountability Metrics, and Analysis. At the same time, some of the popular author-developed indexes include Bebchuk et al.'s (2009) Entrenchment Index (E-Index), the Gompers et al.'s (2003) Governance Index (G-Index), and Brown and Caylor (2006) Governance Score (Gov-Score). Most of the indexes are limited in two ways. One, they use binary variables to capture compliance. Studies (e.g., Holgersson & Nordström, 2016) have shown that decomposing variables into binary elements results in the loss of vital information and subjectivity bias in the cut-off point between the two elements. Two, the indexes are structured to accommodate the distinct institutional arrangements of the authors' countries.

Some theories that explain corporate governance quality include agency, managerial power, stewardship, contingency, transaction cost, institutional logic, and behavioural theories. According to the agency theory, a high-quality governance structure seeks to reduce agency costs by aligning managers' interests with the owners (Jensen & Meckling, 1976; Shleifer & Vishny, 1997). The managerial power theory argues that a high-quality corporate governance structure seeks to reduce friction among board members and align the board's interests with the owners. The stewardship theory (Donaldson & Davis, 1993) argues that managers are trustees and good agents of the business, focusing on realising collective goals over self-interest goals; therefore, the theory posits that a high-quality governance structure is one where the agents are seen as partners who are intrinsically motivated and trusted to achieve the company's goals in collaboration with the owners of the firm (Donaldson & Davis, 1993). Contingency theory asserts that there is no "best" measure of corporate governance quality, and a high-quality governance quality depends on firms' context and specific characteristics. The theory states that the success of an organisation depends on its uniqueness and environmental factors; therefore, a high-quality governance structure adapts to environmental factors (Miller, 2003).

The transaction cost theory (Coase, 1937; Williamson, 1975) argues that a high-quality governance structure achieves economic efficiency by managing the trade-off between internal production cost and the transactions' frequency, uncertainty, and asset specificity attributes. The institutional logics theory posits that corporate governance quality may be determined by the pressure from different interest groups with different institutional logics (Min et al., 2022). Finally, the behavioural theory focuses on the internal functioning of the board. According to the theory, a high-quality corporate governance structure is one in which the board's control and strategic responsibilities are accomplished efficiently (Minichilli et al., 2012; Pettigrew, 1992; Westphal & Zajac, 2013; Zona & Zattoni, 2007).

2.2 Determinants of Corporate Governance Quality

Many studies have considered a variety of variables as determinants of corporate governance quality. These variables include firm size, profitability, leverage, growth, and investment opportunities. The effect of firm size as a determinant of corporate governance quality is mixed. The results show a positive (Cho & Kim, 2003) and a negative (Brown & Caylor, 2009; Jensen, 1986) association. The positive association between firm size and corporate governance quality is grounded on the premise that large firms have the human and financial resources required for high corporate governance quality (Durnev & Kim, 2005). Additionally, to legitimise their operations and reduce stakeholder pressure, large firms engage in a quality governance structure (Ceschinski et al., 2020). The negative association between firm size and corporate governance quality is anchored on the assumption that large firms may have lower growth opportunities and no need for external financing that can pressure them to adopt better control mechanisms (Brown & Caylor, 2009; Jensen, 1986). The effect of leverage as a determinant of corporate governance quality is also mixed in the empirical literature. The results show a positive (Khanchel, 2007; Waweru, 2014) and a negative (Faccio et al., 2001) association.

The positive association between leverage and corporate governance quality is based on the fact that firms' investment needs will motivate them to adopt corporate governance quality that can attract investors' funds (Gyimah et al., 2021; Khanchel, 2007). Furthermore, leveraged firms are pressured by lenders to have a quality governance system (Waweru, 2014). The negative association between leverage and corporate governance quality is based on the argument that poorly governed firms have higher leverage (Hoang & Nguyen, 2020). The effect of profitability as a determinant of corporate governance quality is equally mixed in the literature. Some studies (Jensen & Meckling, 1976; Klapper & Love, 2004) posit a positive association between profitability and corporate governance quality. This result is based on the hypothesis that better-governed firms achieve higher performance and profits. However, some other studies (Cho & Kim, 2003; Gompers et al., 2003) argue that firms only engage in corporate governance quality in the face of dwindling profits. The effect of investment growth as a determinant of corporate governance quality is inconclusive in the literature. Some studies (Khanchel, 2007) posit a positive association between investment growth and corporate governance quality. This result is based on the ground that better-governed firms incentivise management to engage in capital expenditures to improve firm value. However, other studies (Shleifer & Vishny, 1989) argue that entrenched management uses inefficient capital expenditure for personal benefits.

However, our study argues that product market competition is essential when considering firm-level corporate governance quality determinants. Furthermore, the relevance and significance of these determinants may be determined by two control variables: the corporate life cycle and the firm importance. Literature is replete with the role of product market competition in the governance of firms. Studies (Hart, 1983; Salehi et al., 2020) argue that better-governed firms promote competition to resolve the agency frictions between the owners and the agents. Furthermore, other studies (Balakrishnan & Cohen, 2011) posit that market competition disciplines managers from reporting misrepresentations. However, product market competition can also impact firms negatively by creating agency frictions due to loss of revenue due to intense pressure (Laksmana & Yang, 2014). Therefore, competition needs to be tested as a potential determinant of corporate governance quality. There is also growing evidence about the importance of life cycle phases in all spheres of business life. According to Dickinson, Kassa, and Schaberl (2018, p. 2), the firm life cycle phases "*are distinct phases that result from internal and external factors*." The firm life cycle theory assumes that firms will exhibit various characteristics at different life cycle phases. Therefore, we propose that corporate governance quality factors may depend on the life cycle phases. We also consider the firm importance based on the classification mandated by the Central Bank of Nigeria, where some banks were given international licenses, and others were given regional or national licenses to operate.

2.3 Hypotheses Development

The theoretical and empirical literature on the determinants of corporate governance quality is mixed and inconclusive (Mensah & Boachie, 2023). Empirically, prior studies have considered variables such as firm size, profitability, leverage, and growth opportunities as factors that can drive corporate governance quality (Durnev & Kim, 2005; Klapper & Love, 2004; Leão et al., 2016; Waweru, 2014). However, the complementarity effects among variables have not been duly considered in empirical literature (Cueto, 2013; Hackethal & Tyrell, 1999; Masschelein & Moers, 2020; Milgrom & Roberts, 1995). Therefore, our study argues that complementarity may occur among the determinants of corporate governance quality. We also posit that product market competition should be considered as part of the determinants of corporate governance quality within the contextual factors of the firm importance and life cycle phases (Babar & Habib, 2020). On the part of the theoretical literature, some theories that have underpinned the study include agency theory, institutional theory, stakeholder theory, legitimacy theory, transaction cost theory, and resource-based theory. Though these theories provide valuable information about the determinants of corporate governance quality; however, they are limited to the extent that they only consider the "net effect" of individual variables in preference to bundle effects (Misangyi & Acharya, 2014; Ragin & Fiss, 2008; Woodside, 2013; Woodside & Zhang, 2012). Furthermore, most studies have used commercial corporate governance indexes such as the FTSE ISS corporate governance index (2004), Risk Metrics, the IFC scorecard of corporate governance standards, and the Standard and Poor's Governance, Management, Accountability Metrics and Analysis. Other studies have used researcher-constructed indexes that may not have general applicability in all economies (Mensah & Boachie, 2023).

This study differs from previous studies in the following ways. First, the study considers an additional variable (product market competition) and two contextual variables (firm importance and life cycle phases) in addition to the factors identified in prior studies. Second, the study adopts board characteristics to develop a corporate governance quality index. Finally, the study adopts a configurational theory anchored on the tenets of conjunctural causation, equifinality, and causal asymmetry. Conjunctural causation implies that corporate governance quality will result from the interdependency of multiple antecedent conditions rather than a single cause. Equifinality implies that multiple distinct and relevant paths may lead to the same outcome. Causal asymmetry posits that antecedent conditions for a low outcome may not be the mirror opposite of antecedent conditions for a high outcome. Thus, deriving from the tenets of the configurational theory, the study's hypotheses are as follows:

H1: No single determinant is sufficient to achieve high corporate governance quality
H2: Multiple configurations of determinants are sufficient for predicting high corporate governance quality
H3: Configurations of determinants for high corporate governance quality are unique and not the mirror opposites of configurations for low corporate governance quality

3 Methodology

3.1 Data and Sample Description

Twenty-three commercial banks (deposit money banks) are listed on the Nigerian Exchange Group (NGX), where 14 are publicly quoted banks. In comparison, the remaining nine are privately owned banks whose financial statements are not publicly available and therefore excluded from the study. The study uses purposive random sampling to select 11 banks out of the 14 public banks. The selection is justified on two premises; the first is that the banks must have complete information between 2006 and 2021. However, two banks were incorporated in 2012 and excluded from the study. The second basis is the adoption of Nigerian currency as the basis of reporting by the banks; one bank adopted the United States of America (USA) dollar as the basis of reporting and was therefore excluded from the study.

Table 1 Sample selection

	Number
Total population	23
(−) privately owned banks	(9)
(−) banks reporting in currency other than Nigerian currency (naira)	(1)
(−) banks that are taken over during the period under study	(2)
Study sample	**11**

Thus, the sample comprises 11 publicly quoted banks on the NGX (Table 1). The data span 16 years between 2006 and 2021, and the base year was adopted because the CBN corporate governance code for the banks was introduced in 2006.

3.2 Model Specification

Following prior studies (e.g., Durnev & Kim, 2005; Klapper & Love, 2004; Leão et al., 2016; Waweru, 2014), the initial model for the study is as follows:

$$CGQ_{it} = \beta_0 + \beta_1 SIZ_{it} + \beta_2 LEV_{it} + \beta_3 ROA_{it} + \beta_4 TANG_{it}\ \beta_5 GTH_{it6} + e_{it} \tag{1}$$

Given the study's argument on the importance of the product market competition, corporate life cycle, and the firm importance, Eq. 1 is expanded as follows:

$$\begin{aligned} CGQ_{it} = \beta_0 + \beta_1 SIZ_{it} + \beta_2 LEV_{it} + \beta_3 ROA_{it} + \beta_4 TANG_{it}\ \beta_5 GTH_{it} \\ + \beta_6 HHI_{it} + \beta_7 CLC + \beta_8 CIMP + e_{it} \end{aligned} \tag{2}$$

3.3 Analytical Technique

The study applies the fuzzy set qualitative comparative analysis (fsQCA) to achieve the objective. fsQCA is a set-theoretic with a Boolean algebra system that combines quantitative and qualitative approaches to identify bundles of antecedent conditions for the outcome of interest (Fiss, 2011; Greckhamer et al., 2018). The method builds on the configurational theory to account for asymmetry associations among antecedent conditions (independent variables) and the outcome variable (dependent variable). Following prior studies (Schneider & Wagemann, 2012), the study conducts the analysis using three steps: The first step is calibrating all the variables into fuzzy-set membership ranging between 0 and 1. The calibration comprises three thresholds: full membership, non-membership, and crossover point (Ragin, 2000, 2008). The common thresholds are 0.95, 0.50, and 0.05 as measures of full membership, crossover, and full non-membership, respectively. However, other thresholds can be adopted where the data exhibit skewness and non-normal distribution. Data can be calibrated using either the direct or indirect method. The most common and recommended direct method allows the researcher to determine the three thresholds, while the indirect method allows a rescaling of the measurement based on qualitative assessment (Pappas et al., 2017).

The second step is the analysis of the necessary condition; a causal condition is classified as necessary if that condition is always present (or absent) when the outcome is present (Rihoux & Ragin, 2009). Consistency and coverage scores are applied to analyse a necessary condition (Ragin, 2008). Consistency evaluates the "extent to which the combinations of conditions produce the same outcome, while coverage is a measure that indicates the degree of relevance of certain causal combinations to explain the outcome of interest" (Haxhi & Aguilera, 2017). A condition is deemed necessary if the consistency score exceeds the threshold of 0.9 (Ragin, 2008), while the coverage threshold may be set at 0.60 (Schneider & Wagemann, 2012). The third step is examining the sufficient configuration of antecedent conditions for the outcome from the truth table. The truth table shows all the logical configurations of antecedent conditions that can ensure high corporate governance quality. The fsQCA presents three solutions: the parsimonious, the intermediate, and the complex solution, but the intermediate solution is preferred to the other solutions because it accommodates simplifying assumptions based on the incorporation of easy counterfactuals. According to Fiss (2011), "*necessary and sufficient conditions may be present or absent as core and peripheral elements to indicate what variables are crucial for an outcome. Core elements indicate a strong causal relationship with the outcome, while peripheral elements indicate a weaker relationship*". In the interpretation of the output of fsQCA, the black circle represents the presence/high level of a causal condition, the white circle with a cross-out indicates the absence/low level of a causal condition, and blank cells represent 'do not care' or insignificant condition (Fiss, 2011).

3.4 Measurement of Variables

3.4.1 Dependent Variable

Corporate governance quality (CGQ): Following the works of Bowen et al. (2023), we conceptualise corporate governance quality as an index of the board of directors' characteristics. Theoretically, the adoption of a board as a proxy for corporate governance quality is supported by the agency, resource dependence, human capital, team production, and behavioural theories. According to the agency theory, the board is the cornerstone and at the 'apex' of the controlling and monitoring group (Fama & Jensen, 1983). The resource dependency theory argues that an effective board is not only concerned about controlling and monitoring functions but also sets the pace for managerial entrepreneurship and the inflow of network benefits to the firm (Endrikat et al., 2020; Filatotchev, 2007). Furthermore, the board is an ultimate governance mechanism for addressing internal and external influences (Zahra & Pearce, 1989). The human capital theory opines that the capital stock of board members enables the firm to generate and maintain a competitive advantage (Becker, 1975). The team production theory posits that the board has the critical function of creating long-term values and competitive advantage for the firm (Kaufman & Englander, 2005).

The elements of board characteristics considered are board size (BSIZ), board meetings (BMET), board independence (BIND), board gender diversity (BDIV), and board share ownership (BOWN). The study uses a summary index to aggregate the various board characteristics into a single measure, as shown in Eqn. (iii). A summary index facilitates generalised findings; allows uncorrelated random errors to cancel out each other; is less noisy than a single index; and still allows researchers to unpack the index by the analysis of disaggregated variables that constitute the index (Schwab et al., 2020). The study uses a standardised weight index (STATA-swindex) developed by Schwab et al. (2020), which adopts Anderson's (2008) standardised inverse-covariance weighted average of indicators. The method ensures efficiency by attaching greater weight to uncorrelated indicators and less weight to highly correlated indicators.

$$CGQindex_{it} = \beta_1 BSIZ_{it} + \beta_2 BMET_{it} + \beta_3 BIND_{it} + \beta_4 BDIV_{it}\ \beta_5 BOWN_{it} +_{eit} \quad (3)$$

The results show that board ownership has the largest weight (0.29), followed by board size (0.25), board remuneration (0.23), board independence (0.20), and board meeting (0.03), respectively. Each indicator has a positive weight and increases the value of the index. Board ownership (with the largest weight) is 866% larger than the board meeting (board characteristic) with the smallest weight), indicating that board ownership presents more distinct information than the board meeting. Except for board meetings, the weights of the other board characteristics are not wide apart, and their relative similarity shows that each board characteristic provides useful insight into the aggregated index.

3.4.2 Independent Variables

Determinants of corporate governance quality: the study considers the following five variables as determinants of corporate governance quality: competition (HHI), size (SIZ), leverage (LEV), profitability (ROA), asset tangibility (TANG), and growth opportunities (GTH).

3.4.3 Control Variables

The study adopts the corporate life cycle (CLC) and the firm importance (CIMP) as control variables for this study. We adopt Dickinson's (2011) 5-stage model comprising the introduction, growth, maturity, decline, and shake-out phases. The

Table 2 Definitions of variables

SN	Variables	Measurement	Source
Dependent variable			
1	Corporate governance quality (CGQ)	This variable is measured based on Eqn. (3)	Bowen et al., (2023).
Independent variables			
2	Competition (HHI)	Competition is proxied by the Herfindahl Hirschman index, defined as the sum of the market squares of all firms and considers both the number of firms and their market share inequality (**multiplied by − 1).** Therefore, higher values of competition reflect intense competition	Salehi et al., (2020)
3.	Size (SIZ)	This variable is measured as the total logarithm of total assets	Klapper & Love, (2004)
4.	Leverage (LEV)	This variable is the ratio of total debt to total assets (+)	Waweru, (2014)
5.	Return on assets (ROA)	This variable is the firm's profitability measured as net income scaled by total assets.	Waweru, (2014)
6.	Asset tangibility (TANG)	Tangibility is measured as non-current assets over total assets	Klapper & Love, (2004)
7.	Growth opportunities (GTH)	This variable is measured as the yearly net growth in non-current assets	Klapper & Love, (2004); Durnev & Kim, (2005)
Control variables			
8	Corporate life cycle (CLC)	This variable is defined in Table 3	Dickinson, (2011)
9	Firm importance (CIMP)	This variable is an indicator variable where banks permitted to operate internationally by the regulatory authority (CBN) are coded 1, otherwise 0.	

introduction phase is characterised by uncertainty, high risk, equity-financed, low debt, growth potentials, and innovation. The growth phase is characterised by high leverage, free cash flow, working capital, and tangibility. The maturity phase is characterised by negative financing activity-related cash flows, declining investments, greater dividend payments to shareholders, and reduced innovations. The decline phase is characterised by debt repayment challenges, reduced growth opportunities, and a high-risk appetite. The shake-out phase is characterised by declining growth rates, poor efficiency, and going concern challenges.

Table 2 presents the measurement of all the variables in the model. The a priori expectation is that all the independent and control variables have positive and negative effects on the dependent variable (Table 3).

Table 3 Life cycle classification

	Coding	CFO	CFI	CFF
1. Introduction	1	−	−	+
2. Growth	2	+	−	+
3. Mature	3	+	__	+
4. Shake-out	4	− −/+/+	− −/+/+	− −/+/− −
5. Decline	5	− −/− −	+/+	+/_

CFO represents cash flow from operating activities; CFI represents cash flows from investing activities, while CFF represents cash flows from financing activities

Table 4 Descriptive statistics and calibration of variables

Variables	Descriptive statistics				Calibration		
Variables	Mean	Std. Dev.	Min	Max	Full membership **(0.95)**	Cross Over **(0.50)**	Full non-membership **(0.25)**
CGQ	−2.50	1.00	−3.50	3.14	1.52	0.04	−0.62
SIZ	9.24	0.41	8.19	10.07	9.91	9.24	8.99
LEV	0.84	0.19	0.01	1.37	1.00	0.85	0.82
HHI	−0.08	0.00	−0.08	−0.08	−0.08	−0.08	−0.08
TANG	2.98	1.58	1.04	13.74	4.95	2.67	2.09
GTH	16.07	15.23	−68.23	67.90	42.27	16.05	7.02
ROA	0.01	0.04	−0.29	0.08	0.05	0.02	0.01
CIMP	0.75	0.43	0.00	1.00	1.00	1.00	0.50
CLC:Infant (1)	0.11	0.31	0.00	1.00	1.00	0.00	0.00
CLC: Mobile (2)	0.57	0.49	0.00	1.00	1.00	1.00	0.00
CLC:Stagnant (3)	0.33	0.47	0.00	1.00	1.00	0.00	0.00

4 Results and Discussion

4.1 Univariate and Bivariate Analyses

Tables 4 and 5 detail the results of both the univariate and bivariate analyses, respectively. Table 4 shows the descriptive statistics of the non-fuzzy and fuzzy variables, while Table 5 shows the correlation among the variables. The results (Table 5) show that the correlation among the variables is between 0.01 and 0.57 (except for the correlation of control variables between SIZ and CIMP; and between two life cycle stages), which indicates an asymmetric relationship and the impracticability of the assumption that high values of individual factors would lead to high corporate governance quality (Woodside, 2014; Woodside & Zhang, 2012). This asymmetry relation lends credence to the appropriateness of fsQCA for this study.

Table 5 Pairwise correlation of variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) CGQ	1.000										
(2) SIZ	0.158	1.000									
(3) LEV	0.105	−0.210	1.000								
(4) HHI	−0.193	−0.179	0.049	1.000							
(5) TANG	0.052	−0.572	0.267	0.009	1.000						
(6) GTH	−0.076	0.143	−0.071	0.028	−0.333	1.000					
(7) ROA	0.044	0.390	−0.312	−0.184	−0.313	0.184	1.000				
(8) CIMP	−0.063	0.706	−0.271	0.000	−0.304	−0.009	0.316	1.000			
(9) CLC_I	−0.017	0.155	−0.135	0.035	−0.024	−0.016	0.029	0.201	1.000		
(10) CLC_2	−0.141	0.052	−0.136	0.031	−0.030	−0.007	0.252	0.117	−0.399	1.000	
(11) CLC_3	0.160	−0.157	0.233	−0.056	0.047	0.018	−0.286	−0.257	−0.242	−0.793	1.000

4.2 Calibration of Data

Following the recommendations of previous studies (e.g., Ragin & Fiss, 2008), data is calibrated using the direct method, and the threshold for full membership is set at 0.95, the threshold for crossover is set to 0.50, and the threshold for full non-membership is set to 0.25. Table 4 presents the fuzzy and non-fuzzy values for the outcome and antecedent conditions.

4.3 Analysis of Necessary Conditions

The study examines if any antecedent variables are always present (or absent) in all cases with high corporate governance quality (or poor corporate governance quality). Therefore, the raw data matrix is transformed into truth tables using the fsQCA 4.0 software. Following the recommendation of prior studies (e.g., Ragin, 2008), we adopt a 0.95 consistency level for benchmarking configurations and set the frequency threshold to 1. Table 6 presents the analysis of the necessary condition using consistency scores. The results show consistency scores between 0.443 and 0.852, and the coverage scores range between 0.443 and 0.648 (for the presence and absence of corporate governance quality). These results show that no single

Table 6 Analysis of necessary conditions for high and low corporate governance quality

Condition	Consistency	Coverage
CLC_Starter	0.102	0.469
CLC_Mobile	0.487	0.429
CLC_Stagnant	0.412	0.633
CIMP	0.713	0.475
SIZ	0.568	0.569
LEV	0.648	0.648
HHI	0.455	0.455
TANG	0.540	0.540
GTH	0.513	0.513
ROA	0.443	0.443
~CLC_Starter	0.885	0.496
~CLC_Mobile	0.353	0.408
~CLC_Starter	0.761	0.564
~CIMP	0.213	0.425
~SIZ	0.569	0.569
~lev	0.648	0.648
~HHI	0.455	0.455
~TANG	0.540	0.540
~GTH	0.513	0.513
~ROA	0.443	0.443

Source: Authors' Computation (2023)

determinant is sufficient to ensure corporate governance quality since none of the attributes achieves the required threshold of 0.90 (Schneider & Wagemann, 2010). This finding, therefore, supports the first hypothesis (H1), which states that no single determinant can ensure corporate governance quality. The results also validate the configurational theory, which recognises that no single condition is the cause of an outcome of interest (Woodside, 2013; Wu et al., 2014).

4.4 Analysis of Sufficient Conditions

The determination of the sufficient conditions derives from the truth table, which shows all the logical configurations of the factors determining high corporate governance quality. Therefore, following recommendations in prior studies (Gilbert & Campbell, 2015), we set a frequency cut-off value of 1. We also observe the empirical breakpoints, which occur at 0.99, 0.96, and 0.90, and thereafter choose 0.95 as the cut-off point for the consistency threshold. Thus, our consistency threshold exceeds the minimum threshold of 0.8 (Greckhamer et al., 2018). Using the Quine-McCluskey minimisation technique, we derive five individuals but equifinal paths (Table 7).

4.5 Configurations for High Corporate Governance Quality

The results (Table 7) uncover five paths to high corporate governance quality. The consistency levels of the five paths range from 0.95 to 0.99, indicating sufficiency for the existence of the outcome. The overall solution consistency of 0.981, above the threshold of 0.750 (Cheng et al., 2016; Kourtzidis & Tzeremes, 2020), means that about 98% of the cases in the solution present those configurations of causal conditions. The results show that the determinants of corporate governance quality can come from multiple configurations. The solution reveals five paths that we aggregate into three configurations. These results support the second hypothesis (H2) that multiple configurations of determinants are sufficient for high corporate governance quality. We innovatively identify three discernible categories of banks based on Dickinson's 5-stage life cycle model. These banks are "starter" banks, "mobile" banks, and "stagnant" banks. The starter banks are banks at the introductory phase of their life cycle, the mobile banks at the growth and maturity phases of their life cycle, and the stagnant banks are banks at the shake-out and decline phases.

Table 7 Configurations for corporate governance quality

	Configurations							
	High corporate governance quality					Low corporate governance quality		
	1	**2**	**3**	**4**	**5**		6	7
	1 Infant Firm	**2a** Mature Firm 1	**2b** Mature Firm 2	**3a** Decline Firm 1	**3b** Decline Firm 2	Starter firm	Decline firm	Mature firm
CLC_1								
CLC_2								
CLC_3								
CIMP								
HHI								
SIZ								
LEV								
TANG								
GTH								
ROA								
Pooled consistency	0.984	1	0.955	1	0.952		0.913	1
Pooled raw coverage	0.051	0.024	0.018	0.018	0.017		0.018	0.026
Solution consistency	0.981						0.963	
Solution coverage	0.127						0.043	

4.5.1 Determinants of Corporate Governance Quality for Starter Banks (Path 1)

The first identified solution for the determinants of corporate governance quality is for starter banks. The results for systematically important banks present a causal combination in which competition, leverage, and tangibility interact to form a bundle of causal antecedents as determinants of corporate governance quality. To ensure corporate governance quality, systematically important starter banks should adopt competition, debt capital (leverage), and asset tangibility. Starter banks can use product market competition to provide genuine, transparent, and full disclosure to reduce information asymmetry and attract investors' funds (Burks et al., 2018). Well-governed banks also use product market competition to motivate managers to resolve agency frictions and act in the best interest of the owners by reducing managerial opportunism (Laksmana & Yang, 2014). Firms use leverage (debt financing) to reduce agency friction between the principals and the agents (Zhou et al., 2021); and also reduce the amount of free cash that management can spend on personal aggrandisement (Jensen, 1986). Asset tangibility (proportion of non-current assets to total assets) complements debt capital to the extent that it is used as collateral for debt financing; collateral reduces agency friction with debtholders, reduces adverse selection problems, and also mitigates information asymmetry challenges (Degryse et al., 2012). According to Zhou et al. (2021, p. 4), firms with high tangibility need high leverage for performance.

4.5.2 Determinants of Corporate Governance Quality for Mobile Banks (Path 2a And 2b)

The second identified solution derives from paths 2a and 2b for mobile banks. In the first path, 2a, growth opportunities and leverage are the causal conditions determining corporate governance quality for banks at the mobile (growth and mature) phase of the life cycle. This result is supported by empirical findings that firms at their life cycle's maturity and growth phases have investment needs and huge potentials, which may necessitate the firm to engage in external financing through debt. The opportunity to attract investors' capital would incentivise the management of the banks to develop better corporate governance mechanisms (Durnev & Kim, 2005). Studies (Myers, 1977) have demonstrated the positive association between growth opportunity and leverage and argue that mobile banks are more likely to resort to external financing through debt to achieve tax advantages and other benefits. In the second path, 2b, asset tangibility, and growth opportunities determine high corporate governance quality. Growth opportunities are an alternative quality measure and substitute for less leverage in well-governed firms (Korajczyk & Levy, 2003). There is complementarity between asset tangibility and growth opportunities to the extent that banks with large tangible assets are assumed financially stable, less risky, and attractive for growth opportunities financing by the investors. Rajan and Zingales (1998) posit that large tangible assets can provide the impetus to drive growth opportunities. In essence, asset tangibility and growth opportunities can determine corporate governance quality. The combination of asset tangibility and growth opportunities can attract investors, promote comprehensive disclosure and transparency, and align shareholders' interest with that of the agents by promoting shared interest in enhancing the value of the assets and, ultimately, the firm's value.

4.5.3 Determinants of Corporate Governance Quality for Stagnant Banks (Path 3a And 3b)

The third identified solution derives from paths 3a and 3b for stagnant firms. In the first path, 3a, the corporate governance quality for banks with international operations is derived from the causal combination of product market competition, leverage, and asset tangibility. These three factors can interact and complement one another to ensure corporate governance quality. While product market competition incentivises management to make full disclosure to reduce information asymmetry and attract investors' funds (Burks et al., 2018), leverage disciplines management by curbing managerial opportunism in the face of free cash flow (Jensen, 1986), asset tangibility reinforces the confidence of debt holders and agency challenges (Zhou et al., 2021). In the second path, 3b, the corporate governance quality for the banks comprises a causal combination of leverage, asset tangibility, growth opportunities, and profitability. The acquisition of large tangible assets provides the capacity for banks to use as collateral to secure debt capital to fund growth opportunities (Zhou et al., 2021). Investment in growth potentials can generate higher profitability and assist the banks to innovate and introduce new products into the markets.

4.6 Configuration for Poor Corporate Governance Quality

We also conducted an analysis to negate high corporate governance quality. The results are shown in Table 7 under the "Low Corporate Governance Quality" panel. The results show an overall solution consistency of 0.96. Comparing the findings between high and low corporate governance quality shows that configurations of determinants of high corporate governance quality are no mirror opposite of configurations for its negation. These results support the third hypothesis (H3) that the configurations of determinants for high corporate governance quality are unique and not the mirror opposites of configurations for low corporate governance quality.

4.7 Theoretical Contributions

Corporate governance quality in banks is a topical issue in all economies. Unlike prior studies that adopt symmetrical methods to examine the determinants of corporate governance quality, this study adopts the configurational theory. The results propose five paths comprising bundles of antecedent conditions determining corporate governance quality. The study also contributes to knowledge by identifying factors that determined corporate governance quality based on the life cycle phases and the firm importance. The study further classified banks into starter, mobile, and stagnant banks based on Dickinson's (2011) 5-stage life cycle model, where the banks at the introductory phase are called starter banks; those at the growth and mature phases are called mobile banks; and those at the shake-out and decline phases are called stagnant banks.

4.8 Methodological Contribution

The study also makes a methodological contribution by using fsQCA as an analytical technique for the determinants of corporate governance quality. Prior studies have adopted the 'net effect' techniques of regression and structural equation modelling (SEM), which may be inadequate to uncover bundles of antecedent conditions that can interact to ensure corporate governance quality. fsQCA allows antecedent conditions to interact in multiple paths that will lead to the same outcome. The five configurations highlight the importance of equifinality in explaining the determinants of corporate governance quality in banks.

4.9 Managerial/Practical Implications

The results have implications for bank management in Nigeria. A major challenge for banks is aligning strategies, structure, and processes with environmental factors. The findings of this study provide information about alternative combinations of factors that can determine corporate governance quality. Therefore, the knowledge of these five configurations provides alternative corporate governance quality design choices for banks. Specifically, the alternative configurational paths provide banks with information on achieving corporate governance quality within the context of environmental factors such as the life cycle phases.

5 Robustness Analysis

The study conducts some robustness tests to validate the main results. First, we changed the thresholds in the calibration of raw data using 0.85, 0.50, and 0.05 as thresholds for full membership, crossover, and full non-membership, respectively. The results show seven paths, out of which five paths were the same as the baseline results.

6 Conclusion

This study examines the determinants of corporate governance quality in the Nigerian banking industry between 2006 and 2022. An index of board characteristics is adopted as a proxy for corporate governance quality, while firm size, competition, leverage, asset tangibility, growth opportunities, profitability, corporate life cycle, and firm importance constitute the determinants of corporate governance quality. While previous studies have used symmetry methods, including multiple regression techniques and structural equation modelling, this study applies the asymmetry method of fuzzy-set qualitative comparative analysis (fsQCA) to determine the bundles of corporate governance quality determinants. The results show multiple paths of various combinations of determinants that will ensure corporate governance quality in Nigerian banks. Based on the fsQCA results, we outline five different configurational paths ensuring corporate governance quality.

The study has some limitations, which future studies can explore. First, other variables in the literature can impact firm-level corporate governance quality; hence, future studies can consider these variables. Second, the study is restricted to the Nigerian banking industry, which may not be the same as other economies; therefore, caution should be made in generalising the results to other countries.

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Developing a Framework to Address the Slow Implementation of Continuous Auditing by Internal Audit Functions in South Africa.

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Abstract Currently, the internal audit profession is being challenged by developments in technology coupled with real-time approaches to doing business. These developments call for a more proactive audit approach, where transactions and internal controls are audited in real-time as they occur or in a very short time thereafter. Previous research confirmed that organisations have made significant progress in automating their key business processes through the implementation of Enterprise Resource Planning (ERP) Systems. These automated business processes produce real-time high volume of transactions, but internal audit processes providing assurance on these transactions and internal controls have remained manual and not automated. Previous literature has proposed that internal auditors should move towards a continuous auditing approach. This approach is viewed as a solution to enable internal auditors to provide real-time assurance to organisations, thereby delivering a value-added service. However, the implementation of continuous auditing by internal auditors remains relatively low. The main objective of this study is to investigate the factors contributing to the slow implementation of a continuous auditing approach by public sector Internal Audit Functions in South Africa. The ultimate goal will be to make recommendations towards developing a framework to guide and support the adequate and effective implementation of a continuous auditing approach by Internal Audit Functions in South Africa.

Keywords Continuous auditing · Traditional auditing · Teal time assurance

1 Background

The rate at which significant errors, inefficiencies, fraud and corruption occur in public sector organisations in South Africa as evidenced by media reports is concerning. The most worrying factor is that these are not prevented and at times

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go undetected by Internal Audit Functions. Reports in the media have been supported by the findings of the Transparency International (TI). The TI annually publishes the Corruption Perception Index (CPI) which ranks countries by their perceived levels of public sector corruption on a scale from 0 (highly corrupt) to 100 (not corrupt). According to the 2021 CPI (Transparency International, 2022), South Africa was ranked 44 out of a total of 180 countries. Any score of below 50 is described as a significant corruption problem in a country (Corruption Watch, 2021).

The Audit General South Africa (AGSA)'s audit outcome for the 2020/2021 also supports the notion of the TI's above assessment results. The AGSA reported that only 27% (115) of the national and provincial government institutions managed to obtain a clean audit opinion (AGSA, 2021a), while only 16% (41) of the local government institutions obtained a clean audit opinion (AGSA, 2021b). The AGSA defines the clean audit opinion as the outcome where an organization has produced quality financial statements free of material errors or omissions (AGSA, 2021b). The AGSA further reported that irregular expenditure incurred at the national and provincial level remained high at R166,85 billion (AGSA, 2021a), while at the local government level, the figure was R21,10 billion (AGSA, 2021b). These figures suggest that transactions that do not comply with legislation continues to occur within the public sector institutions, despite the existence of Internal Audit Functions. Internal Audit Functions should consider developing and/or revising their audit techniques to ensure that they play an efficient and effective role in corruption prevention and detection (Jeppesen, 2019; Alina et al., 2018). Previous researchers have identified the traditional audit approach currently being applied as one of the main factors contributing to the Internal Audit Functions' inability to proactively assist organisations to prevent significant errors, inefficiencies, fraud and corruption. This is largely due to the fact that the current approach is outdated and has not kept pace with the real-time economy (Byrnes et al., 2018).

Some organisations have made significant progress in adopting technology to automate their key business processes through implementation of the ERP systems (Chan & Vasarhelyi, 2018). These automated processes produce high volumes of transactions, but internal audit processes providing assurance on these transactions remain manual and are not automated (Byrnes et al., 2018; Mantelaers & Zoet, 2018). Researchers in the field agree that the Internal Audit Functions should transition into a continuous auditing approach which is viewed as a solution enabling them to provide to real-time assurance which is expected to add value to the organisations (Chan & Vasarhelyi, 2018; Hazar, 2021; Byrnes et al., 2018; Barros & Marques, 2022; Eulerich & Kalinichenko, 2018). These researchers define continuous auditing as an audit approach whereby transactions and internal controls are audited as they happen or shortly after they have occurred. Furthermore, they assert that continuous auditing has the capability to expand analysis of the organisation's operating activities through leveraging on the use of technology to test the entire population of transactions instead of samples. Mantelaers and Zoet (2018) concurs with this view by stating that corporate scandals that have occurred ask for auditing of full population of transactions and technologies allow for it. The advantage of testing the total population is that it increases the probability of identifying all, rather than a fraction of possible errors, omissions and fraud (Chan & Vasarhelyi, 2018). If errors, omissions or fraud are discovered and reported by auditors when they occur, management will be able to stop such errors, omissions or fraud by implementing corrective measures (Ezzamouri & Hulstijn, 2018).

Although the continuous auditing model has been identified as a solution for the provision of real-time assurance and full population testing to enhance audit quality, its implementation by internal auditors is still relatively low (Chan & Vasarhelyi, 2018; Eulerich & Kalinichenko, 2018). The model is not yet widely used, and its implementation methods are still in the research stage (Hazar, 2021). Most previous research on continuous auditing has been theoretical, covering concepts, possibilities, potential benefits, challenges, and measuring the level of progress in implementation or specifying technical aspects. There is however limited research on how to apply continuous auditing in practice (Ezzamouri & Hulstijn, 2018; Marques & Santos, 2017; Mantelaers & Zoet, 2018). There is still lot of work to be done to ensure that continuous auditing is fully implemented in the organisations Barros and Marques (2022), and Chan and Vasarhelyi (2018) urged continuing partnerships between practitioners to perform more research specifically focussed on the practice of continuous auditing.

Research in this area is therefore critical to provide a framework which would contribute positively towards the adequate and effective implementation of a continuous auditing approach, i.e., automating the internal audit process, by Internal Audit Functions of public sector institutions in South Africa. This implementation would assist in addressing the current challenge of corruption, fraud, significant errors and omissions. A literature review provides insights into the research gap identified. The research objectives and questions are set out and accompanied by a methodological approach that ensures that the stated objectives are adequately achieved.

2 Research Problem

Notwithstanding the fact that the continuous auditing approach, where audit procedures are automated and performed by computer systems, has been identified as a solution which could significantly reduce the occurrence of material errors, omissions, fraud and corruption, its adoption by public sector Internal Audit Functions in South Africa remains low. The current traditional auditing approach where audit procedures are performed manually by auditors has resulted in internal audit reports being issued after errors, omissions, corruption and fraud have already occurred, even too late for any corrective measures to be instituted to recover from such losses. This has possibly had a detrimental effect on the organisations. The lag between the occurrence of business activities and the detection of the errors, omissions, corruption and fraud leaves insufficient time for remediation and recovery of possible losses occurred.

The research problem for this study can therefore be described as follows: the persistently slow implementation of the continuous auditing approach by public sector Internal Audit Functions in South Africa deprives organisations from adequately and effectively addressing material errors, omissions, fraud and corruption which have negative impact on achievement of the organizational objectives.

3 Theoretical Framework

Implementation of the continuous auditing approach within organisations would require Internal Audit Functions to change from the current traditional auditing approach. The continuous auditing model was first introduced by Groomer & Murthy, 1989 as well as Vasarhelyi and Halper in 1991 (Chan & Vasarhelyi, 2018). However, its adoption remains low (Hazar, 2021) considering that the concept has existed for nearly two decades (Chan & Vasarhelyi, 2018). Therefore, the suitable theoretical frameworks which align with the research problem of slow transition from traditional auditing approach to the continuous auditing approach are change management models. There are several change management frameworks such as Kotter's change model, ADKAR model, Lewin's change model, Levitt change model, etc. All these models fall into either of two categories, namely, change that focusses on people or individuals (human change) or the process of executing change (change process) (Lazuardi & Muhyi, 2021).

Kotter's change management model (Kotter, 2012) was chosen as the theorical framework for this study as it focuses on the process of executing change (Lazuardi & Muhyi, 2021). Moving from a traditional auditing approach into a continuous auditing approach would require deployment of effective change process which is the focus of Kotter model. The Kotter model describes the change process by means of the eight steps described below, and each step is explained by the researcher in relation to the research problem for this study:

(a) **Step 1: Establishing a Sense of Urgency**

An urgent need for change should be realised (Galli, 2018) regarding the implementation of continuous auditing approach for the auditors to play an efficient, effective and proactive role in the prevention and detection of significant errors, omissions, fraud and corruption in public sector institutions (Ezzamouri & Hulstijn, 2018; Jeppesen, 2019).

(b) **Step 2: Creating the Guiding Coalition**

A leadership team should be formed by Internal Audit Functions to lead the implementation of the continuous auditing model. This team should be influential and powerful if the implementation of the change is to succeed (Galli, 2019).

(c) **Step 3: Developing a Vision and Strategy**

An explicit strategic vision for change that is easy to understand and outlines the overall goals should be developed (Lazuardi & Muhyi, 2021) to provide a comprehensible roadmap for the change process (Galli, 2018). Internal Audit Functions should develop a roadmap describing the overall goals and change in management activities that must be executed to transition from a traditional auditing approach into the continuous auditing model.

(d) **Step 4: Communicating the Change Vision**

The developed strategic vision for changing from a traditional auditing approach into a continuous auditing model should be communicated to all business units within the organisation. Communication of the strategic vision for change is crucial to bring all employees onboard (Galli, 2018). and this would also ensure that employees support the change (Lazuardi & Muhyi, 2021).

(e) **Step 5: Empowering Employees for Broad-based Action**

Lazuardi and Muhyi (2021) called this step "*Remove Obstacles*" and state that all possible obstacles that could prevent successful implementation of change should be identified and addressed. Galli (2018) concurs with the view that all obstacles should be eliminated. Internal Audit Functions' employees' skills and competencies should be refined to enable them to implement the continuous auditing approach adequately and effectively.

(f) **Step 6: Generating Short-term Wins**

Since, by nature, attainment of the strategic vision takes time, gaining employee support for the sense of urgency, may reduce thinking that their past efforts have been in vain (Lazuardi & Muhyi, 2021). To keep employees motivated and encouraged, short-term achievements should be created and communicated for the purpose of demonstrating that the change efforts are recognised (Galli, 2018).

(g) **Step 7: Consolidating Gains and Producing More Change**

The implementation of the continuous auditing approach should be executed in a phase-in approach whereby it is first applied as a pilot on a few selected business processes. Lessons learned during the pilot implementation should be used to refine the implementation strategy and establish the application of continuous auditing in the remaining business processes.

(h) **Step 8: Anchoring New Approaches in the Culture**

Efforts should be made to ensure that the change implemented is made permanent (Lazuardi & Muhyi, 2021) as employees have a tendency to revert to their old way of doing things even after change (Galli, 2018).

The persistent slow implementation of continuous auditing approach may be attributed to the absence of effective change management by public sector Internal Audit Functions. The question then becomes what can be done to assist Internal

Audit Functions to transition from the traditional audit approach to the continuous auditing model? Using the Kotter model as the base, the researcher will analyse where the indicators of ineffective change management exist in the process of implementing the continuous auditing model within the public sector Internal Audit Functions in South Africa. Using the same lens, the research will seek to understand why the implementation of the continuous auditing model is negatively affected by these indicators. The results of the analysis will assist the researcher in developing a framework to guide and support the adequate and effective implementation of continuous auditing approach.

To contextualise the research objectives and questions, the researcher conducted a literature review of the current state of the continuous auditing implementation. A discussion of the research findings for this literature review is explained in the next section.

4 Literature Review

Chan and Vasarhelyi (2018) confirmed that the traditional audit approach is outdated and will in time be replaced by the continuous auditing model. The study emphasised that organisations have made advances in automating their business processes through the ERP systems that have been implemented. These automated business processes are providing management and stakeholders with a high volume of real time financial information for decision-making purposes (Mokhitli & Kyobe, 2019). It is crucial that these decisions should be based on reliable information (Ezzamouri & Hulstijn, 2018). Byrnes et al. (2018) concurs with Ezzamouri and Hulstijn by alluding that in the same manner that management and stakeholders require real time information for decision making, they will also demand real time assurance on that information. However, internal auditors are executing manual audit procedures on these automated business processes. The result is that they are not able to provide the real time assurance expected by management and stakeholders. The authors therefore recommend that the implementation of the continuous auditing approach which is automation of audit procedures will assist internal auditors to meet this gap between expectation and delivery (Chan & Vasarhelyi, 2018). The automated continuous auditing approach is an approach whereby possible errors, omissions, anomalies in business transactions can be detected and reported by auditors in real time (Hazar, 2021).

With the recommendation provided above, the authors stressed that continuous auditing cannot entirely replace the traditional auditing approach as there are some audit procedures which by nature will always require manual intervention to be executed. These procedures relate to instances where auditors are required to verify estimates or apply judgement to the areas under review (Chan & Vasarhelyi, 2018). Byrnes et al. (2018) agree with this view by emphasising that some aspects of traditional audit approach will continue to hold value. The continuous auditing approach will only apply in transactional verification and compliance verification

(Chan & Vasarhelyi, 2018). Continuous auditing tools and techniques were developed specifically for financial and compliance auditing (Ezzamouri & Hulstijn, 2018). In the continuous auditing approach, audit procedures are performed by computer systems, while in a traditional auditing approach they are performed by human auditors (Hazar, 2021). All audit procedures in continuous auditing are performed in an electronic environment where only digital analysis tools and techniques are used (Mokhitli & Kyobe, 2019).

Chan and Vasarhelyi's study focused on identifying innovations introduced by continuous auditing methodology. Notwithstanding the importance of innovations identified, the study has not covered insights into the implementation process which could be considered by auditors transitioning from the outdated traditional audit approach into the continuous auditing model. Chan and Vasarhelyi urged for continuous partnerships between academic researchers and practitioners specifically to conduct further research on how to put the continuous auditing approach into practice. Hazar (2021) echoes the sentiments of Chan and Vasarhelyi (2018) and acknowledges that the implementation methods of continuous auditing practices are still at a research stage. Hazar is of the view that additional research with a specific focus on the practical implementation of continuous auditing approach will assist in increasing its use within organisations to provide the real time assurance.

The study by Hazar (2021) focused on describing some theorical aspects relating to continuous auditing such as difference between the traditional audit approach and the continuous auditing approach including the phases or stages of each, benefits of continuous auditing, historical development of continuous auditing, developing continuous auditing applications, etc. The author concluded this study emphasising the need for continuous auditing to assist in addressing the current rate of fraud, which is increasing (Hazar, 2021).

According to surveys referred to by Ezzamouri and Hulstijn (2018), the research on the adoption of continuous auditing has only been done within private sector hence their focus was on public sector. The authors' study focused on examining possible adoption of continuous auditing methodology within public sector with specific focus on Municipalities in Netherlands. The study found that it is not feasible to apply continuous auditing approach within municipalities as primary business processes would first need to be improved (Ezzamouri & Hulstijn, 2018). This study only covered the technical feasibility and support of continuous auditing. The current extent of adoption of continuous auditing within these Municipalities was not covered. Instead, the study recommended that more research should be conducted relating on the adoption of continuous auditing in general (Ezzamouri & Hulstijn, 2018).

The study by Byrnes et al. (2018) focused on investigating the extent to which the auditing profession in the United State has advanced in terms of moving from the traditional audit approach towards a more proactive audit approach which they have labelled the "*future audit*". Byrnes et al. (2018) define the future audit as a continuous auditing and proactive approach whereby deviations and anomalies are identified as they occur in real time or closer to real time, thereby assisting organisations in addressing issues of fraud, errors and misuse of resources. The study found that

Continent	Percentage of Publications on continuous auditing
America	37%
Europe	33%
Asia	21%
Oceania	5%
Africa	4%

Fig. 1 Continuous auditing publications by continent

the traditional audit approach is still predominant in the auditing profession (Byrnes et al., 2018). This is despite the fact this traditional audit approach has been confirmed as outdated (Byrnes et al., 2018) considering advances in information technology and real-time approaches applied by organisations in doing the business. These authors recommended that issues of resistance to change, cost, benefits trade-offs, project scope and training the auditors are key aspects to consider for inclusion into the plan if continuous auditing is to be successfully implemented within organisations (Byrnes et al., 2018). The authors concluded with an emphasis that the continuous audit approach would require auditors, regulators and standards setters to consider making significant adjustments in various aspects.

Barros and Marques's study focused on understanding the importance and the use of continuous assurance (continuous auditing) services by internal auditors in Portugal. The study found that there is no correlation between the importance of a continuous assurance service and the use of these services. The internal auditors strongly considered continuous assurance service as extremely important. However, the implementation of these services continues to lag and there is still lot of work to be done to ensure full implementation (Barros & Marques, 2022). The aspect of identifying and analysing root causes behind the slow implementation of continuous assurance (auditing) services was not covered by this study.

A study was carried out by Marques and Santos (2017) with the aim of analysing the evolvement of research on continuous auditing by reviewing 207 publications made between 2000 and 2016. The authors also needed to understand if there is a correlation between the evolution of research on continuous auditing and its very slow implementation in the organisations. The study found that the number of publications on continuous auditing is very low as compared to other topics (Marques & Santos, 2017). The authors believe that this may be a contributing factor towards slow implementation of continuous auditing in the organisations (Marques & Santos, 2017). The findings of the study further indicated that in their studied population of 207 publications on continuous auditing, the majority (70%) was conducted by researchers affiliated with American and European research institutions. Figure 1 below outlines the distribution of publications by continent presented by this study (Marques & Santos, 2017):

In addition, the study showed the breakdown of the publications per country as illustrated in Fig. 2 below (Marques & Santos, 2017):

Country	Number of Publications on Continuous Auditing
United States	67
United Kingdom	27
China	19
Canada	15
Germany	13
Taiwan	11
Australia	10
Romania	6
Sweden	5
Others	34

Fig. 2 Continuous auditing publications per country

Against the above backdrop, it is evident that there is a gap in research on continuous auditing in South Africa in general. Although Marques & Santos' findings indicated that 4% of publications were in Africa, this is still relatively low, and it is possible that none of the 4% are from South Africa.

Like Marques and Santos (2017), Eulerich and Kalinichenko (2018) also conducted a study to analyse the research on continuous auditing. But the latter research focussed specifically on performing content analysis of 100 papers from 38 different journals published between 1983 and 2015. This study aimed at examining the current state of knowledge of continuous auditing within the research space with the ultimate purpose of proposing future research opportunities. From the population of 38 journals, Eulerich and Kalinichenko (2018) extracted the top 10 journals. The journals were ranked according to the number of continuous auditing publications and these publications were categorised in terms of theoretical focus and practical implementation focus. The study found that 92% of the research papers had an academic or theoretical focus, while only 8% focused on the practical implementation of continuous auditing. Eulerich and Kalinichenko (2018) concluded that previous research focused more on the theorical guidance and that there is a significant need for future research with specific focus on the practical implementation of continuous auditing by Internal Audit Functions.

Based on the results of this literature review, it is evident that none of the studies employed the change management theoretical lens to address the current slow implementation of continuous auditing approach. However, Byrnes et al. (2018) identified resistance to change as one of the key aspects to be considered if continuous auditing is to be successfully implemented. The literature reviewed further confirmed that most of the research conducted focused on theoretical aspects of continuous auditing and the majority of these were published in other countries and not South Africa. While these studies contribute positively to continuous auditing key concepts such as definitions, benefits, maturity assessment models, the rate of adoption, etc., they do not address the practical implementation process that must be considered by Internal Audit Functions in order to transition from the outdated traditional auditing approach to the continuous auditing approach.

The researcher therefore postulates that a research gap exists in terms of understanding the slow implementation of continuous auditing approach by Internal Audit Functions in South Africa. Considering that continuous auditing model was first introduced by Groomer & Murthy, 1989 and Vasarhelyi and Halper in 1991 (Chan & Vasarhelyi, 2018), one would have expected that by now significant progress should have been made in terms of its implementation in the organisations. In addition, as confirmed by the outcome of the literature review, there is also a need for lot of research and literature on practical implementation of continuous auditing approach in South Africa with a specific focus on change management theorical frameworks as a base. The adequacy and effectiveness of change management processes employed by Internal Audit Functions in transitioning from traditional audit approach to continuous auditing approach may be a contributing factor to the current slow progress. The researcher therefore aims to pursue this change management lens towards the research problem.

5 Purpose of the Study

The purpose of the study is to investigate factors contributing to the slow implementation of a continuous auditing approach by Internal Audit Functions in South Africa, with a specific focus on public sector institutions. A framework that can inform adequate and effective implementation of a continuous auditing approach to enhance the achievement of organisational objectives would be the ultimate outcome of the study.

6 Research Objectives and Research Questions

6.1 Research Objectives

The researcher proposes the following objectives and sub-objectives to address the problem of slow implementation of continuous auditing approach in the public sector Internal Audit Functions in South Africa and to achieve the purpose of the study:

- To investigate the factors contributing to the slow implementation of a continuous auditing approach by public sector Internal Audit Functions in South Africa. To achieve this objective the following sub-objectives are proposed:
  - To determine Internal Audit Function's governance structures' readiness for adopting a continuous auditing approach.
  - To explore internal auditors' awareness of a continuous audit approach.
  - To explore internal auditors' capabilities to undertake continuous audit approach and
  - To explore organisations' Information Technology capacity to undertake a continuous audit approach.
- To make recommendations towards developing a framework to guide and support the adequate and effective implementation of a continuous auditing approach by Internal Audit Functions in South Africa.

6.2 Research Questions

The following research questions are proposed for the purpose of providing direction to the study and to achieve the research objectives:

- Why is there a slow uptake in the implementation of continuous audit approach by Internal Audit Functions in public sector South Africa? The following sub-questions support the main research question:
  - How ready are public sector Internal Audit Function's governance structures to adopting a continuous auditing approach?
  - How aware are internal auditors of a continuous auditing approach?
  - How capable are internal auditors to undertake continuous auditing approach?
  - How adequate is the organisations' Information Technology capacity to undertake a continuous auditing approach?
- What framework can be developed to best support the adequate and effective implementation of continuous auditing approach by Internal Audit Functions in South Africa.

7 Methodology and Design

7.1 Methodology

The methodology that will be used to achieve the research objectives for this study is a qualitative approach. Creswell (2007) considered a qualitative approach appropriate for the studies performed within the social constructivism paradigm. According to Creswell, the social constructivism paradigm enables the researcher to explore and understand the complex problems that participants experience within their personal and work lives. The slow implementation of continuous auditing is a complex problem which will require in-depth exploration to understand the underlying root causes behind this slow implementation.

7.2 Research Design

A phenomenological design has been chosen by the researcher for this study. A phenomenological study reports the meaning for several individuals of their lived experiences of a phenomenon (Creswell, 2007). According to Creswell (2007), this design is aimed at reducing the individual experiences into a universal phenomenon and describes what the participants have in common as they experience the phenomenon.

7.3 Research Population

According to Hair et al. (2011), the population is the complete group of objects or elements which is relevant to the research study. The researcher acknowledges that the public sector is broad as it includes the three spheres of government (National Government, Provincial Government and Local Government), State-Owned Entities, and Public Entities falling within the various spheres of government. The researcher therefore chooses to focus on one of the three spheres of government which is the National Government as it is responsible for, amongst others, the development of the laws, policies, prescripts, directives, and regulations which all Provincial Government institutions, Local Government institutions, State-Owned Entities and other Public Entities are expected to comply with. The total number of institutions within the National Government will therefore constitute the target population for this study. As at March 2023, there is total of 41 institutions within the National Government in South Africa that house an Internal Audit Function (South African Government, 2023).

7.4 Sampling and Sample Size

Considering that this is a qualitative study, the researcher will use a non-probability sampling as recommended by Hair et al. (2011). In a non-probability sampling, the researcher utilises subjective methods such as personal experience, convenience and expert judgement to select elements in the sample (Hair et al., 2011). These subjective methods will be used to select a sample of participants for this study applying the purposive sampling technique. In this sampling technique, the researcher will apply judgements in establishing which participants will provide the most information relating to the phenomena (Hair et al., 2011; Moser & Korstjens, 2018).

One (1) National Government institution from the total of 41 will be selected for the purpose of this study considering the limited period within which this PhD qualification is expected to be completed. Participants for this study will be sampled from the selected National Government institution. To determine the sample size for these participants, the researcher will set inclusion and exclusion criteria relevant to the achievement of the research objectives.

In a qualitative study, fewer sites or individuals should be selected for the purpose of collecting extensive detail about each site or individual studied (Creswell, 2007). As a result, Creswell recommended a sample size of 5–25 for the qualitative phenomenological study. Moser and Korstjens (2018) are also aligned with Creswell in recommending that phenomenological studies require fewer than 10 interviews. The researcher chose to align with Creswell's recommended sample size considering that this study has three categories of participants, namely Internal Audit Function's staff, Members of Management and ICT Staff. The sample size for this study is therefore envisaged to be 25 participants broken down as follows:

- One (1) Chief Audit Executive who is the Head of Internal Audit Function responsible for providing quality assurance reviews of the audits performed by the internal auditors.
- Twenty (20) Internal Audit Staff reporting to the Chief Audit Executive who have been within the internal audit field for over 10 years.
- Two (2) Members of Management (Auditees) who have transactional and compliance related business processes.
- Two (2) ICT staff members responsible for the technical back end and functionality of the ERP systems.

7.5 Data Collection

The following data collection process will be applied by the researcher to address the purpose of this study:

7.6 Pilot Study

The researcher will engage in a pilot study prior to commencing the data collection process. The objective of this pilot would be to test the adequacy and validity of the questions earmarked for inclusion in the interview guide to address the research problem. Based on the responses provided by these pilot study participants, the researcher will amend the interview questions where necessary to ensure that they are structured in a manner that they will adequately assist in providing the rich data pertaining to insights into root causes of slow implementation of continuous auditing approach.

7.7 Recruitment of Participants

An active or direct recruitment strategy using purposive sampling will be applied to recruit the participants from the selected institution within the National Government for this study. This is a strategy where the researcher uses face-to-face interactions to recruit the participants (Negrin et al., 2022). Being familiar with the population under study, positions the researcher to adequately determine the inclusion and exclusion criteria that will address the research question (Negrin et al., 2022).

7.8 Conducting the Interviews

To obtain detailed insights into the causes for the slow implementation of continuous auditing, the researcher will conduct semi-structured interviews for this study. At the initial stage of the interviews, the researcher will pose broad and open-ended questions to gain an understanding of the problem in its totality (Sekaran & Bougie, 2016). These open-ended questions will be followed by more structured questions linked directly with the research questions. All interviews will be recorded using the audio recording with the participants' explicit consent for such.

7.9 Data Analysis

Unlike the quantitative approach where data collection and analysis follow a set of steps in a predetermined order, with qualitative research, data collection and analysis are often concurrent, with analysis triggering additional data collection which, in turn, requires more analysis (Hair et al., 2011). Analysing qualitative data is not a simple task as the amount of data collected is large by nature and can, at times, be overwhelming. In 1994 Miles and Huberman proposed an approach which could be considered to ease the analysis of qualitative data. Their approach consists of three steps, namely, data reduction, data display and drawing conclusions (Sekaran & Bougie, 2016). The researcher would therefore apply these three steps in analysing the data collected using the inductive approach for this study.

8 Significance of the Study

8.1 Contribution to Organisations

The ultimate goal of every organisation is to achieve its objectives. It must be acknowledged that efficient and effective achievement of objectives is dependent on implementation of effective risk management framework and processes. However, the rate at which significant errors, inefficiencies, fraud and corruption occurs, as evidenced by media reports, suggests that organisations are apparently not winning in terms of moving towards the achievement of their objectives. Implementation of continuous auditing would improve compliance, risk management and the organisations' ability to achieve their objectives efficiently and effectively. Therefore, it is imperative that the slow rate of implementation is addressed.

8.2 Contribution to the Literature and Theory

This study will contribute to the expansion of the literature to address the concerns raised by researchers regarding the limited research on how to put continuous auditing into practice within organisations to provide the real time independent assurance expected by various stakeholders (Ezzamouri & Hulstijn, 2018; Marques & Santos, 2017; Mantelaers & Zoet, 2018; Barros & Marques, 2022; Chan & Vasarhelyi, 2018).

8.3 Contribution to the Internal Audit Practice

The developed framework for continuous auditing implementation will be useful to the Institute of Internal Auditors (internal auditors' governing institution) for updating the Standards to provide guidance on how to effectively perform continuous auditing. Hazar (2021) states that the stages of audit process in traditional auditing and continuous auditing differ from each other. Hazar explains the stages in traditional auditing as planning, fieldwork and reporting. The Institute of Internal Auditors' Standards currently adhere to these three stages of traditional auditing which have not yet been changed to meet the current need for real-time assurance. Internal auditors will become irrelevant within organisations and will fail to meet stakeholders' expectations if they continue to apply the Traditional Auditing approach and not adopt the continuous auditing model.

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Management Accounting Practices and Market Value of Selected Manufacturing Firms in Lagos, Nigeria

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Abstract The quest to survive and compete successfully in the competitive environment has made management accounting practice a concern for companies that has obligation to grow wealth by improving its performance. The study examines the effect of strategic costing, total quality management and business process reengineering on the performance of selected non-listed manufacturing companies in Lagos, Nigeria. Survey research design is used, and data obtained by administering a well-structured 5-likert scale questionnaire to production manager, operation managers and accountants of selected companies which are not public limited companies in Lagos, Nigeria. A total of 333 respondents filed the questionnaire and the data was analysed using a survey ordinary least square regression. The findings shows that total quality management and business processing reengineering are the most relevant modern management accounting practices that have a positive and a significant effect on the financial performance of manufacturing firms in Nigeria. It is concluded that management accounting practices has a positive influence on financial performance of companies that embraces modern management accounting practices. The study recommends that management should ensure consistent review of the business processing to ensure room is made for quality improvement to gain competitive advantage hereby improve the financial performance of the manufacturing firms.

Keywords Business process reengineering · Financial performance · Management accounting · Total quality management · Strategic costing

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1 Introduction

The manufacturing sector is an imperative sector of the economy and remains one of the sectors that contribute significantly to the Gross Domestic Product (GDP) of the economy and increasing the national wealth of the economy. In the developed economy, the sector is a value adding sector and offers a strong macro-economic indicator. The stride of manufacturing sector in the developing countries portrays them as an engine for development and alleviation of poverty and this efforts makes the economy stronger (Ogundajo & Nyikyaa, 2021). Manufacturing firms in Nigeria face a range of challenges, including the high cost of production, inadequate infrastructure, and limited access to finance and this has eroded the performance of the sector over time (Ogundajo & Nyikyaa, 2021). Since the sector is considered as the key driver of economic growth and development, the financial performance of the sector reflects the overall health of the economy (Kenton, 2022).

In the manufacturing sector, the concern of management as well as top accounting executives to improve the quality of information needed for strategic decision has resulted to adoption of some modern techniques as new management accounting practices (MAPs). Furthermore, it has been reported over the years that the implementation of MAPs fails to meet organization needs. The failure was traced back to the use of traditional management accounting practices to operate business activities which does not have the ability to operate in the changing environment manufacturing firms operate thereby contributing to poor performance (Sitienei & Memba, 2016). The paucity in performance which can be traced to the failure of manufacturing firms to utilize innovative management accounting practices affect business analysis and strategic implementation and also create impediment for organization to compete in the competitive market (Achchi & Athembawa, 2021).

In quest to survive and compete successfully in the competitive environment and augment performance, management of manufacturing firm has made effort to improve its management practices through the adoption of innovative management accounting practices. Different organization adopt diverse of practices that is dependent of the organization internal and external factors. The modern management accounting practices that are emerging includes strategic costing, total quality management, throughput accounting and business process reengineering practices (Watts et al., 2014).

Strategic costing approaches to MAPs focuses on long term planning and its implementation offers a strategy that boost the organization strategic position. It is an important practice it focuses more on both internal and external factors such as competitor, market growth, demand, consumer taste and preferences. From the depiction of these practices, it is widely belief that their implementation will help to improve product quality, gain a competitive edge and enhance performance. In same vain, total quality management (TQM) was adopted into the practices. This practice involves ensuring that the product is offered without defeat to customer and enabling customer place much value on such product. TQM has a great impact on business operations and the practice has significantly helps in cutting business cost in terms of reduction in wastage rate. It focusses on continuous improvement of product that will offer more value and satisfaction to customers. Likewise, the business process reengineering practices (BPR) was adopted into the MAPs. The practices redefine the system of production and suggest the best way the production process can be run effectively so as to suit product improvement. With BPR, the firm is able to evaluate and restructure operation and production process in other to achieve outstanding result.

Meanwhile, prior studies such as Omogboya and Addah (2016); Sarah et al. (2018); Nartey and van der Poll (2021) have not adequately address the effect of some identified management accounting practices. Evidences from studies conducted in Africa especially in Nigeria on management accounting practices have mainly considered its effect on financial performance from the perspective return on assets, (Adu-Gyamfi & Chipwere, 2020; Evi et al., 2015; Kumar & Shanmuganathan, 2019; Oladimeji et al., 2017), return on equity (Andrea et al., 2021; Benneth et al., 2019; Zarinah et al., 2018), return on capital employed, (Nartey & van der Poll, 2021; Ngozi et al., 2021; Erasmus, 2021; Otieno et al., 2017), firm value (Ogundajo & Nyikyaa, 2021; Emerole & Chukwu, 2017; Omogbiya & Addah, 2016).

Very few studies have examined its impact on financial performance proxied by market value and to fill the gap in literature, market value is considered because market measure is a reflection of future and long–term financial performance against accounting measures which is considered a past and short term performance (Gentry & Shen, 2010). This then imply that using this measure will expose the long term effect of these modern techniques rather than short term effect focused on by previous studies. The study examined three modern management accounting practices to determine whether they significantly contribute to the financial performance of companies.

The paper is structured into five separate headings and other subheads; these cover the introductory aspect of the study, the review of the literatures and hypotheses development to clarify concepts and showing interactions between variables in line with previous studies. The third heading is the explanation of data and methods used in the study. The analysis and discussion of findings are explained in the fourth heading and finally, the conclusion and recommendations are outlined in the fifth heading.

2 Literature Review and Hypothesis Development

2.1 Management Accounting Practices

Management Accounting is a branch in accounting that focus on providing information to management for internal purpose. Nizar (2021) defined management accounting practices as a system that assist firms in generating information needed for budgeting, reporting, controlling, measuring performance and costing of product or service that aids managerial decision making. Ogundajo and Nyikyaa, (2021) stated that management accounting practices is described as a system that helps organization to adopt a tools, techniques and system in other to achieve organizational corporate objectives. According to Aruah et al. (2023) management accounting practices are system that enables organization to assess their operations, and which also help them to plan, direct and control operating costs in order to achieve objectives. Extant definitions shows that management accounting practices is a system, and the system is aimed at providing information for managers in order to assist in planning, controlling and directing activities in other to achieve objectives.

Since management accounting is based on providing information for internal consumption, the practices to put in place strategies that will provide information from the information systems must be the one this is consistent with the norms, cultures and values of the organization and this practice must also be consistent with the corporate objectives of the organization. Williams and Branch (2019) posit that the implementation of management accounting practices will enhance organization survival in the changing world and among competitors. This is so because management accounting practices offers a framework for gaining competitive advantage, guide actions, motivate behavior, promote organization cultures and create value to the firm. Imran (2018) affirms that since management accounting practices operates in a changing environment therefore, there is a need for development of new management accounting practices. Implementation of new management accounting practices will help to reinstate the relevance of management accounting to the current needs mainly to enhance performance, efficiency, and gaining competitive advantage.

2.2 Financial Performance

Organizational performance measures the actual output or results of an organization against intended or planned outputs (or goals and objectives) (Emiaso et al., 2018). Performance measures that compare actuals result and planned result measured in financial terms is termed financial performance. Olowookere et al. (2021) defined financial performance to be the extent or degree to which financial objectives are being achieved or accomplished. It can be seen as an independent indicator that is designed to show how best an organization can use its resources to produce income for the company (Machova & Durisova, 2018). Firm financial performance is assessed with the use of a varieties of indicators spinning between financial and non-financial context. Those indicators include gross profit margin, return on asset, market value, return on equity, return on capital employed, earnings per share, return on investment, asset turnover, product quality, customer loyalty level, customer retention rate, employee satisfaction level.

Firm performance helps to assess business prospect which can lead to increased employment prospects and high-income generation. Firm performance enables organizations to analyze its strategic plans and use the appropriate resources and efforts to accomplish business goals (Taouab & Issor, 2019). When it comes to pinpointing possible areas in a business for making improvements and raising the bar on performance, performance assessment plays a crucial function in the organization, especially for managers (Mirdad & Eseonu, 2015). Through firm performance assessment, organization can identify opportunities in relation to metrics and implement strategies to improve business process. Organizational performance primarily focused on an organization's capacity and ability to effectively utilize the resources at its disposal to deliver results consistent with the company's established objectives, as well as considering their importance to its users (Bartoli & Blatrix, 2018). The concern of management and business stakeholder to augment financial performance has shifted their concern towards focusing on business and management practices among which management accounting practices was considered (Hariyati et al., 2023).

However, a well implemented management accounting practices is expected to contribute positively to the value of the firm, thus enhancing the financial performance of the organization. Adu-Gyamfi and Chipwere (2020) contend that financial performance is an outcome factor of management accounting and organization change, a firm experiencing low performance would result to change in management accounting and internal factor to improve performance. Adu-Gyamfi and Chipwere (2020) emphasized on the contingency theory and explain that organization can only improve financial performance provided that it changes its management accounting practices based on the internal factor of the organization, therefore, performance cannot be enhanced when the change in management accounting practices is not contingent of the internal factors emanating within the firm.

2.3 *Strategic Costing and Financial Performance*

Strategic costing system is a new trend in cost system that focuses on adoption of a new technique in assigning cost to a product or service. According to Cadez and Guilding (2008), strategic costing system is defined as the use of competitive strategies and costs as well as data to develop strategies that can provide sustainable competitive advantage. It is aimed at reducing cost as well as improving the strategic position of the business. Alsoboa et al. (2015) describe strategic costing techniques as an advance management accounting practices that helps to improve the system of determining and measuring cost which leads to cost savings and reduction. Evi et al. (2015) define strategic costing as the process of using cost information, market-oriented data and strategy to develop strategies in order to achieve competitive edge on continuous basis. Based on their study, strategic costing is not only seen as a tool to reduce or control cost, but a tool that will help a firm to gain a competitive edge in the market through the service it renders or product it offers.

Strategic costing offers tools such as Activity-Based Costing (ABC), Target Costing (TC), Life Cycle Costing (LCC). ABC is an alternative to the absorption costing. It is a costing approach that allocate and assigned cost to cost object (such as product) based on the activity performed. TC is aimed at reducing the overall cost of product over the life of a product and focusing on customer demand. It involves setting a target cost for a product after a target selling price and target profit margin has been known and the difference between the target selling price and target profit is called the target cost (Sukari, 2008). LCC involves estimating the cost that are involved in producing, procuring, operating, and maintaining a product throughout its life. LCC could be regarded as whole life costing. It is a strategic costing technique tailored to identifying total cost associated to a product for decision making process. The integration of ABC, TC and LCC demonstrate the strategic nature of costing system (Grossu-Leibovica & Kalkis, 2023). The objective is not focus on cost control, cost reduction or profit but focus on how cost is assigned in order to achieve long term goals and competitive advantage.

Strategic costing has been upheld in prior studies (Adigbole et al., 2020; Henri et al., 2016) as one of the management accounting practices that affect performance. Aruah et al. (2023) found out that strategic costing has significant influence on sustainability and financial performance of manufacturing firms in Nigeria. Almatarneh et al. (2022) found in a study conducted in a logistics company that a statistically significant relationship existed between the management accounting practices supply chain performance. Ngozi et al. (2021) support the findings where they examine the impact of strategic management accounting practices on financial performance in Nigeria. It was revealed that the strategic costing system has a positive and significant relationship on return on equity and earnings per share. Nartey and van der Poll (2021) also found out that strategic costing technique has an impact on the performance and sustainability of a manufacturing firm in South Africa. However, Sarah et al. (2018) provided a contrary finding where they studied the impact of the use of the costing system on financial performance of firm listed on Tehran stock exchange. The findings of the study show that there is no significant effect between strategic costing and financial performance of the firm. Similarly, Kornchai (2018) used the structural Equation Model (SEM) to investigate the influence of strategic cost management on profitability of instant fast-food business in Thailand. The findings of the result indicated that strategic costing does not have a significant impact on firm profitability. Inconclusive findings still exist it is therefore hypothesized that:

H_O1: strategic costing has no significant effect on the financial performance of listed manufacturing firms in Nigeria

2.4 Total Quality Management and Financial Performance

Total Quality Management seeks to achieve improvement in quality of products, product innovation and timely improvement of products (Grossu-Leibovica & Kalkis, 2023). The Chartered Institute of Management Accounting define total quality management as an integrated and comprehensive system of planning and controlling all business function so that products or services are produced which meet or exceed the customer's expectation. The customer's expectation is the success factor in an organization product or service which include quality, time and innovation.

Singh and Kumar (2018) define the concept of total quality management as a continuous improvement approach for quality of goods and services delivered through the involvement of all and function of the organization. It is a management accounting practices that seeks to achieve improvement in quality of organization product and services so as to meet the expectation of customers and even beyond. Sathish and Shanmuganathan (2019) opined that it is a method by which managers and employee can become involved in the continuous improvement of the production of goods and services. It brings the interplay of employee and management in the process of meeting customer's expectations. Omogbiya and Addah (2016) define total quality management as a quality management approach which means a total commitment to quality in all areas of the organization. The ultimate focus of total quality management is improving quality above the expectation of customers and ensuring improvement in products on a timely basis (Njeri & Ensar, 2020). It integrates all areas of satisfying customers and including how fast the product is delivered (Emerole & Chukwu, 2017). It is an imperative source for creating enhancement in competitiveness through improving the overall effectiveness of firm performance (Ehsan & Najla, 2019). It is a practice that helps to bring progress and continuous improvement in the area of cost, reliability, quality, innovative efficiency and business effectiveness (Kakkar, 2017).

Total quality management has been upheld in prior studies as one of the management accounting practices that affect performance. Ali and Johl (2022) found that there is a positive and significant impact of soft TQM practices (top management commitment, customer focus and employee training) on financial, social, and environmental performance. This study also indicates that hard TQM practices (process management, quality information analysis and advance manufacturing technology) significantly enhances financial, social and environmentally sustainable performance. In the study conducted by Ogundajo and Nyikyaa (2022), it was revealed out Total Quality Management have a positive and significant effect on performance of manufacturing firm in Nigeria measured by market share. Using a descriptive cross-sectional method, Alghamdi (2018) examined the relationship between total quality management on organizational performance. The study adopted a primary source of data where a questionnaire is administered to 163 managers in different level of organization. The Pearson correlation analysis result reveal that there is a positive relationship between total quality management and organizational performance. Otieno et al. (2017) also found out that total quality management has a strong positive relationship with organizational performance. Zarinah et al. (2018) used a survey research design to assess the effect of total quality management on organizational performance of manufacturing firm in Malaysia. The findings of the study reveal that there is a strong positive relationship between total quality management and organizational performance. Although there is consistency in these findings of this study, however there is a need to validate the empirical evidence in Nigerian context. It is therefore hypothesized that:

H_O2: Total quality management has no significant effect on the financial performance in listed manufacturing firms in Nigeria.

2.5 Business Process Reengineering and Financial Performance

Oladimeji et al. (2017) defined business process as a set of activities that transform a complex activity through information technology into a more usable interrelated activity. Business process comprises a set of interrelated elements coupled together that transform organizational input into a required output in order to achieve the objective of the organization. Reengineering of this business process occur when a system is put in place so as to bring the business process up to date and redesign such process with the aim of bringing improvement in the area of quality of output, output cost reduction, timely availability of output. Yan et al. (2018) defined business process reengineering as an elementary improvement effort and radical business process redesign to achieve improvement in critical measures of efficiency such as cost, quality, service and speed. It a management accounting practices that involves re-evaluating and updating the business process so as to achieve improvement in business process in area of quality, cost reduction, speed, competitiveness, customer services etc. and thus enhancing organization performance (Baihaqi et al., 2023). The reengineering process replaces the manual way of transforming business activities into automated way and eliminating unnecessary way of organizing business activities as well as providing right information at the right time to the right people, eliminating unnecessary work and reducing unnecessary control (Benneth et al., 2019).

Studies on business processes reengineering and financial performance has provided empirical evidence on whether it influences financial performance. Baihaqi et al. (2023) found that business process reengineering has significant influence on the performance of e-commerce system in Nigeria. In the study of Li and Nazif (2022) it was found out that there is a significant positive relationship between business process reengineering and financial performance. The study further reveals that an increase in business process reengineering will lead to a 79.5% increase in financial performance. The findings of Kamau et al. (2022) supported this where it was revealed that there is significant and positive effect between business process reengineering and financial performance of service delivery firms in Kenya. Agbionu and Audu (2021) investigated the effect of business process reengineering on financial performance of manufacturing firm in Nigeria. The result shows that there is a significant positive relationship between business process reengineering and financial performance. The study further reveals that an increase in business process reengineering will lead to a 79.5% increase in financial performance. Using a descriptive research design, a similar study was conducted by Kithinji, et al. (2021) where they examined the effect of reengineering strategy on financial performance of manufacturing firm in Kenya. The result shows that there is a positive association between business process reengineering strategy and financial performance. The analysis suggests that a unit increase in business process reengineering strategy will lead to a positive increase in financial performance. Benneth et al. (2019) study reveals that business process reengineering has a significant and positive effect on the financial performance of firm in the industry. Andrea et al. (2021) assessed the effect of implementation of reengineering of production process on financial performance of company. The findings show that the implementation of business process reengineering has a positive impact on financial performance. The study therefore concludes that the implementation of business process reengineering will help to improve profitability (return on asset, return on equity, profit margin, return on sales, return on share capital), efficiency in activity (inventory turnover, asset turnover) and leverage (financial leverage). Based on the consistency of the findings, it is therefore hypothesized that:

H_O3: business process reengineering has no significant effect on financial performance of listed manufacturing firms in Nigeria

3 Conceptual Framework

The study is conceptualized to indicate the relationships among the variables as shown in Fig. 1.1. The independent variables management accounting practices proxy by strategic costing, total quality management and business process re-engineering while the dependent variable is financial performance proxy by market share.

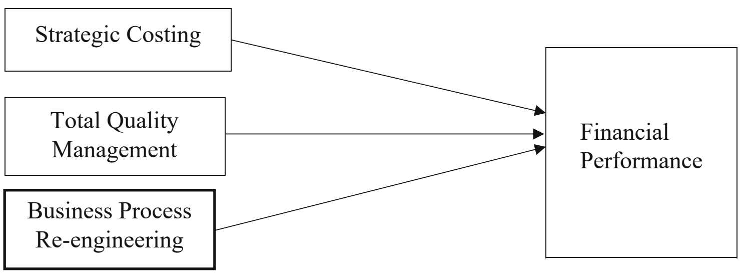

Fig. 1.1 Conceptual framework. Source: Author's Conceptualization (2023)

4 Theoretical Underpinning

The study is based on the assumption of Resource based theory. Resource based theory is one of the theories in management that was propounded by Wernerfelt in the year 1984. The theory assumed that firms within the same industry cannot be comparable because of the stock of resources available to them to gain strategic advantage hence; organization will adopted a process or system that is supported by the internal resources possessed by the organization.

The theoretical framework of this theory is focused on identifying the quality of organization resources that cannot be imitated by competing firm. From this stand point, if resources of an organization can be imitated by a competing firm within the industry, a competitive advantage cannot be achieved. Thus, competitive advantage can only be achieved by deploying in an efficient and effective manner, the available resources that cannot be used or imitated by another competing firm. Following the premise of the theory, Russo and Forts in 1997 classify organization resources as physical assets and technology, human resources and organizational capabilities and intangible resources. According to the assumption of resource-based theory, organization should implement or adopt a management accounting practices that support organization resources such as tangible and intangible assets and human resources so as to achieve a competitive advantage.

This theory is imperative to this study because it helps to gain understanding that the adoption of management accounting practices to enhance performance in the industry should be the one that must be supported by organization internal resources. If an organisation does not have a core competency in terms of human resources (employee), financials, procurement etc., the implementation of management accounting practices might not be able to enhance performance (Tharamba, et al., 2018). Therefore, core competencies (resources) of organization from primary and supporting activities provide a supporting framework for management accounting practices.

5 Data and Methods

The research design employed is a survey research design using primary source of data obtained by administering questionnaire to selected target respondents. This research design is considered more appropriate because the managers and accountants will have appropriate responses and also since selected companies are not public limited companies (PLC), such information is not readily available unless they are reached out to. Data were collected using structured questionnaire which were administered to accountants and managers of sampled manufacturing firms in Lagos, Nigeria. The population of the study consists of 2000 respondents which are the number of registered manufacturing companies in Lagos (MAN, 2020).

Table 1 Reliability test of variables

Variables	Reliability Co-efficient	Average inter-item covariance	No of items
Strategic costing			
Cronbach alpha Kaiser-Meyer-Olkin (KMO)	0.6957 0.666	.1778848	6 6
Total quality management			
Cronbach alpha Kaiser-Meyer-Olkin (KMO)	0.6867 0.622	.1000732 –	7 7
Business processing			
Cronbach alpha Kaiser-Meyer-Olkin (KMO)	0.6681 0.668	.1358878 –	6 6
Financial performance			
Cronbach alpha Kaiser-Meyer-Olkin (KMO	0.6985 0.644	.0938396 –	7 7

Source: Author's Computation (2023)

The study adopted multi-stage sampling technique. The first stage, stratified sampling technique was used where the companies were grouped to groups (Clothing and Textiles, Chemicals and Plastics, Pharmaceuticals, Food Production, Wood, Leather and Paper, Metal manufacturing). This gives a good representation of specific group because the manufacturing industry has a large variety of production. At the second stage, random cluster sampling was considered to segregate the area where many of this company which can be considered a medium enterprises with minimum of 50 employees which can imply large production scale. Manufacturing companies clustered at Ikeja axis (Ogba, Oregun and Oba Akran) and Isolo, Lagos was considered. At the last stage, 50 companies were randomly sampled. 500 questionnaires was administered to accountants in the Account and Finance department and the managers of selected manufacturing firms in Lagos State, Nigeria and only three-hundred and thirty-three (333) questionnaires were returned making 66.6%. The questionnaire were designed using a 5-likert scale ranging from strongly agree, agree, undecided, disagree to strongly disagree with strongly agree.

In order to verify the validity and reliability of the research instrument, Cronbach Alpha was used to test if the questions asked in the questionnaire are significantly relevant to each objective of the study. The percentage of reliability of questions raised to assess strategic costing is 69.57% and 66.6% valid using Kaiser-Meyer-Olkin Measure of Sampling Adequacy. The question raised to assess total quality management is 68.67 reliable and 62.2% valid using Kaiser-Meyer-Olkin Measure of Sampling Adequacy. The percentage of reliability of questions raised to assess business processing is 66.81% and 66.8% valid using Kaiser-Meyer-Olkin Measure of Sampling Adequacy; and lastly, from Table 1, the percentage of reliability of questions raised to assess financial performance is 69.85% and 64.4% valid using Kaiser-Meyer-Olkin Measure of Sampling Adequacy. However, the reliability coefficient for all variables is less than 70%, which is considered strong reliability.

The model specified in this study is based on the theoretical foundations of the study which is adopted from Ogundayo and Nyikyaa (2021).

$$\mathrm{FP} = f\ (\mathrm{MAP}) \tag{1}$$

$$\mathrm{FP} = \alpha_0 + \alpha_1 \mathrm{SC} + \alpha_2 \mathrm{TQM} + \alpha_3 \mathrm{BPR} + \mathrm{U} \tag{2}$$

α_0 = Intercept

α_1, α_2, α_3 = Coefficient of the Independent variable

U = Captures other variable not included in the model and it takes care of other factors that cannot be observed or computed due to lack of data. The a priori expectation was there would be a positive relationship between the dependent and independents variables of the study.

Where:

FP = Financial Performance
MAP = Management Accounting Practices
SC = Strategic Costing
TQM = Total Quality Management

The necessary data were generated from information revealed from the structured questionnaire using descriptive statistics such as percentages, frequency, mean, and standard deviation to explain the descriptive aspect of the data and inferential statistics to analyses the data. Specifically, the analytical tools engaged is Ordinary least Square (OLS) regression was used to show the effect of the dependent variable on the independent variables.

6 Data Analysis and Discussion of Finding

6.1 Data Presentation

The demographic profile of the respondents is essential to be described in order to validate the appropriateness of the respondents. From Table 2, it is shown that out of the 301 questionnaire that was distributed, 162 of them are female while the remaining 139 are male representing 46.18% and this implies there is fair on distribution between the two prominent genders. Also, the largest percentage of the respondents representing (25.25%) are between the ages 45–49, followed by ages between 50–60 representing 20.60%. The ages between 20–24 have 19.27% while ages 40–44 have 15.61% and the remaining respondents are between the ages of 25 and 34. A total of 171 of the respondents have a first degree while the remaining 130 have post graduate degrees.

Table 2 Demographic information of respondents

Demographic information		Frequency	Percentage	Cumulative
Gender	MALE	162	53.82	53.82
	FEMALE	139	46.18	100.00
Age	20–24	58	19.27	19.27
	25–29	30	9.97	29.24
	30–34	28	9.30	38.54
	40–44	47	15.61	54.15
	45–49	67	25.25	79.4
	50–60	62	20.60	100.00
Educational status	HND/BS.C	171	56.81	56.81
	M.Sc./Ph.D	130	43.19	100.00
Management level	8–11	79	26.25	26.25
	13–14	104	34.55	60.80
	15–17	118	39.20	100.00
Number of years in service	1	9	2.99	2.99
	2	4	1.33	4.32
	3	3	1.00	5.32
	4	130	43.19	48.51
	5	107	35.55	84.06
	6	48	15.95	100.00

Source: Author's Computation (2023)

The grade levels of the respondents is between 8 to 17 as 34.55% of them (104) are between grade level 8–11, 26.25% (104) are between grade 13–14 and the remaining 39.20% (118) are between level 15–17. The largest number of the respondents have spent just 4 year in active service representing 43.19%. A total of 107 respondents also have 5 years' experience, 48 respondents have 6 years working experience and 9 respondents have 1 years working experience while the remaining 7 respondents have working experience of 2 years and 3 years.

7 Test of Variables

7.1 Correlation of Study Variables

The results shown in Table 3 indicate that there is positive relationship between strategic costing and financial performance and the implication is that one time improvement in strategic costing among manufacturing companies will improve by their financial performance by 21.29% which is significant having p-value of 0.0002. Also, total quality management has a positive relationship with financial performance having a coefficient of 19.81% and the relationship is significant having probability value of 0.0005. Likewise, the relationship between business processing

Table 3 Correlation matrix

Variables	Details	Financial Performance	Strategic costing	Total Quality Management	Business Process Reengineering
Financial performance	Corr. Coeff. Rho (N) – Sig. Obs	1.0000 - 301	0.2129 0.0002 301	0.1981 0.0005 301	0.3271 0.0000 301
Strategic costing	Corr. Coeff. Rho (N) – Sig. Obs	0.2129 0.0002 301	1.0000 - 301	0.1803 0.0017 301	0.2579 0.0000 301
Total quality management	Corr. Coeff. Rho (N) – Sig. Obs	0.1981 0.0005 301	0.1803 0.0017 301	1.0000 - 301	0.1419 0.0137 301
Business process reengineering	Corr. Coeff. Rho (N) – Sig. Obs	0.3271 0.0000 301	0.2579 0.0000 301	0.1419 0.0137 301	1.0000 - 301

reengineering and financial performance have a coefficient of 0.3271 implying 32.17% increase in financial performance if there is one time improvement in business processing reengineering. The relationship is considered significant having a p-value of 0.0000. Furthermore on Table 3, the relationship between strategic costing and total quality management have a coefficient of 0.1803 implying 18.03% increase in strategic costing if there is one time improvement in total quality management. The relationship is considered significant having p-value of 0.0017. Also, the relationship between strategic costing and business processing reengineering has a coefficient of 0.2579 implying 25.79% increase in strategic costing if there is one time improvement in business processing reengineering. The relationship which is considered significant having p-value of 0.0000 and lastly from Table 3, the relationship between total quality management and business processing reengineering have a coefficient of 0.1419 implying 14.19% increase in total quality management if there is one time improvement in business processing reengineering. The relationship is considered significant having a p-value of 0.0137.

8 Result and Discussion of Findings

In a further move to test the hypothesis relating to the specific objectives of the study, ordinary least square regression is considered to analyze the effect between the dependent and independent variables and the result is presented in Table 4. The t-value and the probability values are used as the indices of interpretation. The R-Square result implies that the predictors' regression coefficients in the model are not equal to zero but has predictive value of 11.85% variation in the dependent variables and the remaining given to error term. The specified model is significant at definite degree of freedom (F: 3, 4 = 14.69; Prob > F = 0.0126).

The overall result shows that management accounting practices have a positive and a significant effect on the financial performance of manufacturing firms in Nigeria. This was evidenced by the co-efficient value of strategic costing showing .06533, t-score of 1.22 and a P-value of 0.270, which means insignificance at 5%. The implication is that strategic costing can positively contribute to manufacturing firm performance, but the effect is weak and insignificant. It is also shown from the table that total quality management have a positive and significant effect on financial performance showing coefficient of .1585; t-value of 2.98 and a P-value of 0.025, which means significance at 5%. The implication is that total quality management can positively contribute to manufacturing firm performance. And lastly from Table 4, it is shown that business processing re-engineering has positive and significant effect on the financial performance of manufacturing firms as indicated by the results of coefficient value of .1196; t-value of 3.00 and a P-value of 0.024, which means significance at 5%. The implication is that business processing re-engineering can positively contribute to manufacturing firm performance. From the above results, the null hypothesis that management accounting practices have no significant effect on manufacturing firms' performance is hereby rejected.

The results align with the findings of Ngozi et al. (2021) that investigates strategic management accounting practices on financial performance and discovered that target costing has a positive but no significant relationship on return on equity. Likewise, it supports the findings of Sarah et al., (2018) who studied the impact of the use of the costing system on financial performance of firm listed on Tehran stock

Table 4 Survey ordinary least square regression results

Financial performance	Coef.	Std. Err.		Z	P > |z|	[95% Conf. Interval]
SC	.0653359	.053752	1.22	0.270	−.0661906	.1968624
TQ	.1585314	.0531707	2.98	0.025	.0284274	.2886355
BPR	.1196664	.0399286	3.00	0.024	.0219646	.2173682
_cons	2.900602	.1983403	14.62	0.000	2.415281	3.385923
R-squared = 0.1185						
Number of obs = 301						
F(3, 4) = 14.69 Prob > F = 0.0126						

Source: Researchers' Computation (2023)

exchange. The study adopted a survey research design. The findings of the study show that there is no significant effect between strategic costing and financial performance of firm. It also aligns with the findings of Otieno et al. (2017) who examined the effect of total quality management practices on organizational performance of a manufacturing firm in Kenya. The regression result reveal that total quality management has a strong positive relationship with organizational performance.

However, the findings contradict the results of Trairong and Naphaphorn (2019) which examined the impact of strategic cost management techniques on financial performance of firms in Thailand by using ordinary least square, the study reveal that strategic cost management techniques have a significant impact on financial performance.

9 Conclusion and Recommendations

The study concluded that when explaining the effect of management accounting practices on the financial performance of manufacturing firms in Nigeria, total quality management, business processing reengineering are the most significant to financial performance of manufacturing firms in Nigeria. The findings of the study further uphold the resource dependency theory which its implication is imperative to this study because it helps to gain understanding that the adoption of management accounting practices to enhance performance in the industry should be the one that must be supported by organization internal resources.

Based on the findings of the study, the following recommendations are made:

1. Management of manufacturing firms should ensure that modern techniques are employed for strategic costing in order to gain positive improvement in their financial performance.
2. Manufacturing Association of Nigeria (MAN) should ensure there is guideline for total quality assurance to improve on quality of products and retrospectively on the firms' financial performance
3. Management should ensure consistent review of the business processing to ensure room is made for quality improvement to gain competitive advantage hereby improve the financial performance of the manufacturing firms.

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Government Welfare Grant and Low-Income Households Investment Behaviour in South Africa

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Abstract This study delves into the socio-economic factors influencing the investment patterns of low-income households, often termed non-Ricardian households (NRHs), in South Africa. These NRHs predominantly rely on governmental welfare benefits for their daily needs. The main research question is to empirically investigate if government welfare grant crowd-out low-income household investment in South Africa. Utilizing data from the first five waves of the National Income Dynamics Study (NIDS), we explored the socio-economic traits of NRHs. Analysis methods included pooled ordinary least squares (OLS), fixed and random effects, IV-GMM approaches to address the problem with endogeneity. A significant finding was that household grants appeared to deter investments, suggesting that welfare benefits might inadvertently suppress the investment initiatives of these households. This underscores the adage that merely giving fish might weaken a household's drive to learn fishing. Moreover, socio-economic variables explained roughly 48% of the investment tendencies of these South African households. The persistent nature of poverty establishes a detrimental cycle wherein one issue amplifies another, potentially leading to issues like reverse causality, which could question the validity of pooled OLS estimates in this study. Nevertheless, the study's results and implications are vital for policymakers. To address this, the government should prioritize fostering entrepreneurship, particularly among historically marginalized communities, to combat inequality. This approach has the potential to generate lasting wealth, reducing the number of families that fall into the low-income category in future generations.

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Keywords Investment · Non-Ricardian households (non-Ricardian households) · Government grants

1 Introduction

The importance of households' investment in boosting economic growth cannot be over-emphasised in the literature (Ahuja & Pandit, 2020; Gizaw, 2020; Rahman & Ferdaus, 2021; Chinwoke & Victor, 2022; Akay & Oskonbaeva, 2022). Investment plays a vital role in developed and developing countries economic development (Gizaw, 2020; Rahman & Ferdaus, 2021; Chinwoke & Victor, 2022). The need for domestic private investment provided by the household to boost a sustainable economy is well documented in the literature (Bakari & Sofien, 2019; Baral et al., 2019; Rahman & Ferdaus, 2021; Kayhan, 2022). Household investment and savings are big push to break the vicious circle of poverty. Despite the numerous benefits of investment as a way out of poverty, several low-income South Africa is still trapped inside the vicious circle of poverty. The vicious circle of poverty is the precariousness of household conditions where low savings precede earning low, which leads to low investment, generating low productivity and making poverty self-perpetuated (De Vos et al., 2020). However, a historical undertone exists in South Africa's poverty trap deeply rooted in the apartheid era, as Zwane et al. (2016) revealed. A regime that stripped the historically black people of their economic rights and productive engagement in factors of production which created generational poverty for some and generational wealth for others. This antecedence creates inequality and contributes significantly to South Africa as one of the most unequal societies in the world.

De Vos et al. (2020) provided empirical evidence on the importance of fiscal stimulus provided through government welfare grants to boost household consumption and savings in South Africa. However, the growth in the South African populace entering the population of dependent households on social safety net is alarming. Almost 40% of South African households depend on government social grants to survive. South Africa is always receiving praise in the literature as the largest safety net provider in Africa (De Vos et al., 2020). The literature is skewed towards the importance of providing social grants to the most vulnerable people. However, the consequence is the burden on government spending, funded by taxpayers. The consistent increase in the number of people entering the threshold of receiving government grants reveals the number of people becoming unemployed or underemployed, which invariably means they are entering the poverty threshold, apart from the fact that South Africa's economy is struggling in and out of recession. The recent report on the decay of infrastructural facilities, the government needs resources to revitalise. There is a need to grow low-income households into middle-income and affluent households that will participate in the financial market and build the country's depleting tax base.

This paper examines socio-economic determinants of investment behaviour of low-income households (non-Ricardian households (NRHs)), in South Africa. NRHs comprise low-income households, depending largely on government welfare benefits for sustenance. The research utilises the National Income Dynamics Study

(NIDS) dataset, waves one to five. The longitudinal survey was analysed to determine the socio-economic characteristics of NRHs in South Africa. The estimators that were used are pooled ordinary least squares (OLS) method and fixed and random effects methods. The household grant contributed negatively to the level of investment, which indicates that social grants have a crowding-out effect on the investment behaviour of low-income households. Thus, handing out fish indeed enhances the inability of low-income households to fish.

Furthermore, social-economic determinants account for 48% of the investment behaviour of low-income households in South Africa. The self-perpetuating nature of the poverty problem leads to a vicious cycle by which every factor in this cycle causes and affects another factor, possibly leading to reverse causality and threatening the reliability of pooled OLS estimates for the research. However, the consistency of the results and the research implication should warrant attention by policymakers. The government should create an environment focusing more on entrepreneurship development in low-income households, generally and specifically within the historically disadvantaged group. This will reduce inequality and create generational wealth with the capacity to reduce future inequality by reducing the number of households that cross the low-income threshold.

The rest of this paper is presented in the following sections: section 2 discusses the theoretical overview and review of relevant literature, followed by Section 3, which explains the adopted model and estimation techniques employed in this study. The second to the last session, session 4.0, presented the data analysis and discussion of the result while the last session concluded and provided the policy implications for the findings.

2 Theoretical Overview and Literature Review

From a theoretical perspective, economists often depict savings as a deduction from a two-sector circular economic flow, while investment represents an infusion into this system. The prevailing belief is that savings and investment balance each other out over time — withdrawals (savings) equate to injections (investment).

The persistent cycle of poverty illustrates the interconnected factors that maintain an individual or household within the confines of poverty. A challenge with this cycle is its cyclical nature: each element is both a result of and a contributor to the situation, perpetuating the state of poverty. For instance, the limited income experienced by non-Ricardian households results from low productivity, leading to minimal savings. These scanty savings, while a consequence of limited income, further cause inadequate investments. This insubstantial investment then translates to reduced human and material resource productivity, eventually looping back to limited income and reinforcing the cycle of poverty.

Social grants aim to elevate individuals out of poverty by addressing basic needs and offsetting household expenses. They are designed to alleviate the financial strains on households, particularly those associated with children and the elderly,

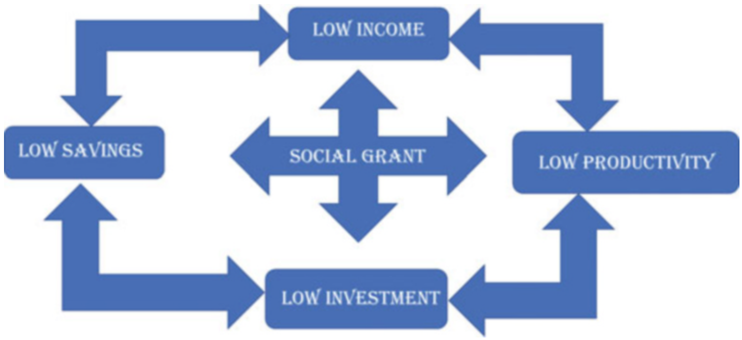

Fig. 1 The vicious cycle of poverty

allowing households to allocate a more significant portion of their earnings for present or future investments.

Figure 1 portrays this relentless poverty cycle, emphasizing the need for a substantial intervention—or a "big push"—to break free. This push could be strategically structured support: Social grants might be envisioned either as a means of providing immediate sustenance (akin to giving fish) to stimulate self-sufficiency or as an investment in expanding productive capabilities (akin to offering fishing nets or equipment) to augment income. However, the effectiveness of such interventions hinges on individuals' willingness to work and the presence of essential skills. Absent these factors, the grants risk becoming a crutch, reinforcing the cycle of poverty rather than alleviating it.

A core objective of this study is to decipher whether social grants act as catalysts (push factors) or hindrances (pull factors) in influencing the investment behaviours of non-Ricardian households.

Numerous studies have explored the influence of socio-economic elements on savings and investment patterns (Achar, 2012; Sabri et al., 2020; Alex & Chungath, 2021). Key among these factors are age (Nie et al., 2019; Hauff et al., 2020; Worasatepongsa & Deesukanan, 2022), education levels (Nandini, 2018; Lusardi, 2019; Sabri et al., 2020), and locational aspects such as urban versus rural settings.

The noticeable decline in investments is a matter of concern, more so when weighing its crucial function in fostering economic expansion, as underscored in contemporary research (Nguedie, 2018; Nguyen & Trinh, 2018; Yeboua, 2021). Empirical data points to the idea that nations with elevated household savings rates amass larger reserves for investments. This not only bolsters industrial progression but also curbs unemployment, stabilizes prices, and lays a foundation for sustained growth (Xu, 2012; Suppakitjarak & Krishnamra, 2015; Ogbokor & Samahiya, 2014; Chen et al., 2021; Tan et al., 2022).

Aruna and Rajashekar (2016) delved into the determinants influencing individual investment choices within the framework of behavioural finance theory. Their findings underscore the absence of a singular determinant guiding individual investment decisions. Instead, the factors vary widely based on individual preferences, timing, type of securities, and regional aspects. They advocate for investment decision-makers to holistically evaluate all variables and their potential impact. Concurrently, they stress the importance of recognizing other market investment avenues fuelled by individual savings, advocating for these to be effectively communicated to potential investors via the financial infrastructure.

Dahiya and Chaudhary (2016) contend that the financial system, encompassing financial institutions, markets, instruments, and services, plays a pivotal role in effectively channelling savings into investments. Therefore, financial markets significantly impact economic development, especially since such development is closely tied to savings and investment rates. The authors also highlight various imperfections within these markets, which can lead to mismatched expectations due to reasons like human greed, systemic flaws, or broader national challenges. Additionally, they emphasize the influence of demographic factors on an investor's decisions, as these can significantly shape individual purchasing choices, whether for goods or services.

This study relies on the proposition by Ucan (2014), that financial development facilitates the movement of resources from savers to the highest-return investment activities, increases the number of funds available for investment, and thus reduces the liquidity constraints. This means accumulated financial resources arising from domestic savings in the economic-financial system assist in reducing the overall costs and risks of investment that stimulate capital accumulation through investment financed by domestic savings. Despite the numerous benefits of investment, lack of saving and investment by low-income households characterises many of these households in the South African economy since the post-apartheid era (Simlet et al., 2011; Aron et al., 2012; Chipote & Tsegaye, 2014).

Aggregate investment in industrialised countries is aptly captured by conventional models like the flexible accelerator. However, a fitting paradigm for emerging nations remains elusive. Core assumptions of these models include flawless capital markets, an absence of liquidity constraints, and the omission of governmental roles. In recent decades, the role of financial factors in elucidating investment patterns over time and across nations has garnered significant research attention. Schumpeter's early assertion (Schumpeter, 1932) about the crucial role of financial systems in bolstering technological progress has been reaffirmed by studies highlighting the influence of financial determinants on investment in both emerging and industrialised countries. These studies also integrate the Keynesian notion that the "state of credit" sways investment decisions (Keynes, 1937, 1973; Ucan, 2014). A distinguishing feature between developed and developing nations is the sophistication and intricacy of financial intermediaries, which facilitate the movement of accumulated savings between savers and investors (Gurley & Shaw, 1955).

2.1 Research Design and Methodology

An extensive review of the literature was undertaken to establish a theoretical framework concerning the link between government welfare grants and the investment behavior of non-Ricardian households in South Africa. This study delved into the most recent classifications by Li and Spencer (2016) to identify the determinants of investment choices for low-income households. While such a comprehensive literature review provides a robust theoretical foundation, it might overlook the unique investment contexts of South African households, potentially missing key factors affecting their investment behaviors.

This research utilized secondary data sourced primarily from Data First to probe the determinants of savings and investment behaviors of low-income South African households. Data First offers curated cross-sectional data for African countries and is responsible for the National Income Dynamics Study (NIDS), South Africa's premier longitudinal national survey.

Initiated 15 years ago by the President's Policy Coordination and Advisory Services, with support from various governmental departments, especially Statistics South Africa, the NIDS's maiden survey in 2008 encompassed 7300 households, reaching over 28,000 participants nationwide (SALDRU, 2009). The study sheds light on the sustenance strategies of households and individuals. Managed by the South African Labour and Development Research Unit (SALDRU) and overseen by the University of Cape Town, the NIDS conducts a panel survey biennially, covering South African residents of all age groups. Participants from the 2008 survey are thus re-interviewed biennially, maintaining consistency in questions. For a more detailed understanding of NIDS, refer to www.nids.uct.ac.za. This longitudinal survey is consistently repeated biennially, re-engaging with the same respondents to gather evolving demographic and socioeconomic insights.

2.2 Model Specification

The objective of this section is to design models to achieve the primary and specific aims of the research. The open model formulated by Adegbite and Adetiloye and Adegbite (2013) is adapted in this study to include variables like household income, expenditure, race, household size, head of household's education, investment, and other relevant elements. The equation is as follows:

Equation (1) represents investment (HHI) for a selected South African household:

$$\mathrm{HHI} = \mathrm{F}\,(\mathrm{HHIC}, \mathrm{HHEXP}, \mathrm{HHSZ}, \mathrm{HHHE}, \mathrm{RACE}, \mathrm{AGE}, \mathrm{GENDER}) \tag{1}$$

On the right-hand side are variables representing household income, expenditure, size, race, gender, age, and age squared (envisioned as a quadratic function). All these variables are derived from the NIDS data made publicly available by Data First.

An econometric depiction of the model is as follows, while Eq. 1 presents a functional outline of the elements affecting the investment behavior of non-Ricardian households in South Africa:

$$\begin{aligned} HHIt = \alpha 0 + \beta 1HHICit + \beta 2HHEXPit + \beta 3HHSZit + \beta 4HHEit + \beta 5RACEit \\ + \beta 6GENDERit + \beta 7AGEit + \beta 8AGE2it + \mu i + \varepsilon it \end{aligned} \tag{2}$$

In Eq. 2, 'i' signifies the number of low-income households in South Africa included in the model, and 't' indicates the time periods. This equation aims to assess the direct impacts of household socio-economic factors. The regression coefficients are symbolized by and 0, where the latter denotes the unique effect specific to each household and the regression disturbance term, with all variables in Eq. 2 remaining as earlier specified. Ultimately, it is projected that investment levels will react positively to all the explanatory variables representing various external influences within the model.

Baltagi (2008) contends that panel data analysis provides deeper insights into many economic phenomena, predominantly dynamic in nature. Hence, the dynamic imbalanced panel was deemed the most suitable approach for this study. In the panel estimation, a lag of the dependent variable was introduced as an independent variable, categorizing it as a dynamic panel model in econometric terms.

In the econometric model, the endogenous variable is the household level of investment. This refers to the combined productive expenditures made by all members of the same household, aimed at generating immediate or future income.

As for the explanatory or independent variables: HH-Income: This represents the combined income of all members living in the same household. HH-Size: This denotes the total count of individuals residing in a single household. HH-Age: This reflects the age of the head of the household, measured in years. HH-Employed: This variable indicates the employment status of the household's head, with "1" signifying employed and "0" indicating unemployed. HH-Male: This variable captures the gender of the household's head, where "1" stands for male and "0" for female. HH-Province: In this model, the baseline is households that are located in the Western Cape. HH-Rural: Households situated in rural areas are designated with a "1", while those not in rural areas are marked "0". HH-Urban: Households situated in urban areas are given a "1", whereas those outside urban areas receive a "0". HH-Farms: This variable indicates households that are located on farms, with "1" signifying they are and "0" indicating they aren't. HH-Black: For the purposes of this study, the baseline was set at black households.

2.3 Sample Method

For this analysis, we relied exclusively on data collected by NIDS, which reportedly employed a stratified sampling technique. Stratified sampling divides the population into several homogeneous, non-overlapping groups or strata. This approach is used to cater to non-homogeneous populations, aiming to provide a representation that is more accurate than what simple random sampling might achieve (Maree et al., 2016, p. 195).

2.4 Estimation Technique

This study follows the recent work of Chen et al. (2023) on the effect of financial literacy as a determinant of market participation: new evidence from China using IV-GMM. The study argues that financial literacy determines household participation in the market. The estimation of Eq. 2 with pooled ordinary least squares (POLS) will create a biased estimate. De Vos et al. (2020) adopted fixed effect panel regression in their determinant of savings model, which control for unobserved heterogeneity across households. The fixed effect is limited in addressing all the sources of endogeneity as the endogeneity problem. In this context, the issue of endogeneity is prevalent. It stems from the theoretical concept of the poverty cycle, which suggests that low-income results in low savings. In turn, low savings lead to minimal investment, which then causes low productivity. This cycle eventually circles back to the onset, with low productivity resulting in low income. This self-sustaining cycle of poverty means each element within it both influences and is influenced by another, leading to a phenomenon known as reverse causality. Such a dynamic compromises the validity of pooled OLS estimates. However, the assumption of endogeneity from the reverse causality, given the explanation of the vicious circle of poverty, may likely result in biased estimates. This study adopted the model of Chen et al. (2023) since IV-GMM will address the endogeneity issues inherent in estimating Eq. 2, which was not discussed explicitly in De Vos et al. (2020). The IV-GMM adopted here makes most of the opportunity of panel data by using the lag of the endogenous variable as an instrument to address the endogeneity problem as explicitly explained in the literature (Chen et al., 2023). Therefore, this model was estimated with pooled OLS, random effect, fixed effect and IV-GMM. The models are robust to heteroscedasticity and distributional assumptions with a framework that accommodates unbalanced panels and multiple endogenous variables.

3 Data Analysis and Discussion of Findings

This section introduces the graphs that explain the relationship between the variables under consideration. The following sub-section presents the socio-economic determinants of the investment model, followed by the interpretation of the results, the conclusion and the discussion of the findings. The conclusion and recommendations are in the last section.

Table 1 showcases the findings from our exploration of how government welfare grants influence the investment behaviours of low-income households in South Africa. The study operates on the premise that, at the time the NIDS data was collected across all five waves, every household receiving government grants was categorized as poor. The set of explanatory variables encompasses household income from diverse avenues such as earnings from the labour market, income generated from subsistence farming, and earnings from other part-time endeavours by household members. Other variables include household expenditure, the quantum of government grants received, the racial composition of household members, provincial location, and the geographical categorization of their residence.

To ensure a comprehensive analysis and robustness, eight different estimations were executed. These are: pooled OLS (1), random effects (2), fixed effects models (3), general household income (4), replacing general household income with household wages (5), substituting household income with household expenditure (6), results specific to non-Ricardian (low-income) households (7), and finally, Ricardian households for a comparative perspective (8).

Based on the pooled OLS estimation and the Ramsey RESET test for potential omitted variable bias, the findings suggest the absence of unobserved individual effects. This is derived from the test statistic of 1.92, which isn't significant at a 10% threshold, implying that the hypothesis of no omitted variable is accepted. For a more rigorous validation, other variations of panel data models were analysed. Notably, both the F-test (with a value of 7.02) and the Wald test (with a value of 470.71), significant at 1%, affirmed a consistent impact direction concerning the primary variable of interest: the household's receipt of government welfare grants and its effect on investment behaviours. However, the Hausman test produced a value of 3.023, which was not significant. As a result, the null hypothesis supporting the validity of GLS estimates couldn't be negated, suggesting the random effects model as the most fitting.

Moreover, since endogeneity and biasness of the pooled OLS, random effect and fixed effect can arise from various sources which is beyond statistical power of those three estimates. We further estimate instrumental variable general method of moment (IV-GMM) to address the endogeneity concern and double sure that our estimates are reliable for policy recommendations. The results IV-GMM estimate number (4) indicate that household income had a positive and significant impact on household investment as expected but the household size had a significant negative impact on household investment, and the government welfare grants received by a household has a negative and significant impact on household investment, all other

Table 1 Effect of Government Welfare Grant on Non-Ricardian Household Investment Behaviour

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	POLS	RE	FE	INCOME	WAGE	EXP	NR	R
Income	0.732***	0.655***	0.407**	1.103***	1.045**	1.059***	1.023***	1.409***
	(0.0582)	(0.0681)	(0.175)	(0.193)	(0.412)	(0.158)	(0.219)	(0.420)
Grant	−0.144***	−0.140***	−0.106	−0.126**	0.0581	−0.0718	−0.117*	−0.0427
	(0.0430)	(0.0401)	(0.0756)	(0.0559)	(0.149)	(0.0679)	(0.0600)	(0.134)
Household size	−0.0312**	−0.0268**	0.0433	−0.0623***	−0.0503	−0.0291	−0.0528**	−0.144*
	(0.0129)	(0.0130)	(0.0678)	(0.0209)	(0.0493)	(0.0183)	(0.0219)	(0.0842)
Coloured	0.452***	0.495***		0.103	0.180	0.0714	0.0679	0.651*
	(0.138)	(0.137)		(0.164)	(0.426)	(0.192)	(0.180)	(0.367)
Asian/Indian	0.557**	0.754***		0.0418	−1.540	−0.380	0.0422	0.174
	(0.225)	(0.259)		(0.374)	(0.986)	(0.432)	(0.462)	(0.496)
White	0.933***	1.041***		0.318	0.140	0.266	0.323	1.078
	(0.143)	(0.148)		(0.245)	(0.703)	(0.270)	(0.276)	(0.676)
Male	−0.0564	−0.0463		−0.0568	0.214	−0.0282	−0.0466	0.113
	(0.0711)	(0.0720)		(0.0856)	(0.186)	(0.0991)	(0.0885)	(0.279)
Urban	−0.366***	−0.364***	−0.489**	−0.203*	0.123	−0.471***	−0.143	−0.971**
	(0.111)	(0.109)	(0.229)	(0.123)	(0.399)	(0.150)	(0.129)	(0.427)
Farms	−0.673**	−0.604**		−0.294	−0.360	−0.347	−0.214	−1.458**
	(0.288)	(0.292)		(0.316)	(0.682)	(0.339)	(0.314)	(0.721)
Eastern cape	0.583***	0.627***		0.415*	1.060*	0.436	0.335	1.103***
	(0.185)	(0.179)		(0.249)	(0.592)	(0.297)	(0.280)	(0.395)
Northern cape	0.380***	0.386***		0.317**	0.491	0.311	0.298*	0.914
	(0.130)	(0.126)		(0.155)	(0.351)	(0.198)	(0.164)	(0.588)
Free state	0.305	0.337		0.0823	1.219**	0.160	0.0599	0
	(0.211)	(0.211)		(0.231)	(0.556)	(0.262)	(0.244)	(0)
KwaZulu_Natal	0.533***	0.547***		0.491***	0.957**	0.468**	0.390**	1.852***

	(0.155)	(0.152)		(0.184)	(0.463)	(0.228)	(0.195)	(0.438)
Northwest	0.0619	0.143		0.00326	0.810	−0.151	0.0408	−0.104
	(0.171)	(0.169)		(0.207)	(0.522)	(0.266)	(0.213)	(0.734)
Gauteng	0.267*	0.329**		−0.0909	−0.0622	−0.102	−0.0911	0.513
	(0.138)	(0.139)		(0.179)	(0.538)	(0.211)	(0.192)	(0.389)
Mpumalanga	0.150	0.232		0.0138	−0.272	−0.0120	−0.0700	1.453***
	(0.171)	(0.171)		(0.213)	(0.518)	(0.239)	(0.221)	(0.461)
Limpopo	0.582***	0.658***		0.323	1.267*	0.238	0.295	1.039**
	(0.181)	(0.181)		(0.216)	(0.679)	(0.261)	(0.228)	(0.513)
Wave2	0.401***	0.412***	0.479***					
	(0.117)	(0.0980)	(0.123)					
Wave3	0.267**	0.312***	0.457***	−0.181	−0.438	−0.190	−0.188	−0.404
	(0.114)	(0.112)	(0.168)	(0.123)	(0.296)	(0.135)	(0.135)	(0.354)
Wave4	0.386***	0.363***	0.382*	−0.122	−0.188	−0.00455	−0.165*	0.300
	(0.112)	(0.115)	(0.197)	(0.0950)	(0.266)	(0.117)	(0.0976)	(0.342)
Wave5	0.589***	0.631***	0.734***					
	(0.115)	(0.129)	(0.258)					
Constant	1.375***	1.896***	4.059***	−1.226	−1.873	−0.692	−0.614	−4.476
	(0.508)	(0.556)	(1.483)	(1.631)	(3.605)	(1.389)	(1.859)	(3.107)
Observations	866	866	866	496	176	497	449	47
R-squared	0.403		0.321	0.400		0.156	0.411	0.613

Robust standard errors in parentheses
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

things being equal. The control variables such as gender and race are not significant determinant of household investment behaviour. More so, the result revealed that urban household investment was less than the rural households. This became evidence in the province variables that revealed that households in eastern cape, Northern Cape and Kwazulu Natal invested more than households in western cape.

The household wage and household expenditure are an important determinant of households' investment with 1% increase in household wage leads to 1.045% increase in households' investment all other factors remain fixed as revealed in the estimate number (5). Similarly, a 1% increase in household expenditure leads to a 1.059% increase in household investment ceteris paribus as revealed in the estimate number (6). The analysis of non-Ricardian household and Ricardian household in estimate number (7) and (8) respectively, revealed that household grant negatively affect the investment behaviour of low-income households, but the welfare grant is not a significant determinant of Ricardian household behaviour while other explanatory variables like income and household have maintain their direction with previous estimate. The effect of government welfare grant on household investment behaviour presents a surprising result. The negative relationship was not anticipated as the literature revealed that household welfare grant enhances household savings behaviour. Therefore, the assertion that low-income south Africa household saves for future consumption not necessarily to invest maybe true in this case. The observed relationship was negative, which contrasts with the expected positive association with savings. A likely explanation is that these households receiving grants are typically low-income and often don't participate in investment activities. Instead, they tend to direct any accumulated savings towards expenses. This underscores the observation that Non-Ricardian Households exhibit negative savings and limited investment. In essence, government grants seem to suppress household investment because these non-Ricardian households not only lack the means to invest but also lack the incentive, given their dependence on the government for both current and future income.

These findings align with the research by Zwane et al. (2016), who discovered that factors like income, age distribution, and employment status heavily influence South African household savings. Their assessment showed a negative connection between household size and investment, highlighting the potential drawback of larger families on household investment. While their research utilized only the initial three waves of the NIDS data and wasn't specifically centered on NRHs, our findings resonated with theirs, albeit with varying degrees of impact.

4 Conclusion and Policy Recommendations

This section concludes the study with a summary of the findings and provide policy recommendation based on the result generated from the study.

4.1 Conclusion

The findings revealed that pooled OLS technique was most appropriate for isolating the socio-economic determinants of investment. This simple static model was thus most appropriate, primarily due to the invariance? of many socio-economic variables and due to the fact that it produced an unbiased result, as detected by the Ramsey-RESET test. The two results follow the economic expectations of the two equations in sect. 2.2. They show that household income, household size, household geographical location and household grants, among others, are major socio-economic determinants of investment behaviour in South Africa. Government grants received by households negatively impacts investment behaviour The result that government grants crowd out household investment as households over-depend on the government for both present and future income. Urban and farm households save less than rural households, the reason being that farm workers earn very low incomes and lack the financial capacity to invest. In the same vein, urban low-income households faced with urban spending and high living expenses, exhibit behaviour as described by Ando and Modigliani (1963) that household consumption pattern does not only depend on income but also neighbours' pattern of spending. The urban spending lifestyle includes from accommodation rental and expenses related to urban social amenities.

This research offers valuable insights into the challenging landscape of household investment among low-income families in South Africa. Such households often grapple with substantial debt and are burdened by escalating interest rates and the demands of debt repayment. With rising household debt and disposable income growth lagging behind inflation rates, many South African families resort to utilizing their retirement savings to meet daily living expenses, rendering investment increasingly improbable or unattainable.

4.2 Recommendation

The research suggests that the government should foster an environment that grants non-Ricardian households' greater access to assets such as land, capital, and affordable quality education. This would empower them to partake in productive endeavours and elevate the likelihood of transitioning from non-Ricardian to Ricardian households. Furthermore, there should be an emphasis on generating more employment opportunities for low-skilled workers. Additionally, the government should actively promote campaigns to decrease birth rates among low-income families. Doing so would substantially cut expenses for these households, enhance their capacity to save for investments, and provide an avenue out of the entrenched cycle of poverty.

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Technologies of the Fourth Industrial Revolution and their Impact on Business Strategy

Zandile Mahlangu and Collins Leke

Abstract The study examines how the implementation of the elements in the cyber space of the Fourth Industrial Revolution (4IR), and strategy, or the lack thereof, impact on business. We cannot undermine the significance of business strategy especially when deciding which key disruptive technologies will form part of operations. 4IR without strategy is an unproductive and fruitless investment, and business strategy without the imbedded concept of 4IR results in outdated systems and operations that are quite evident from the detrimental failures of entities that delayed adopting 4IR within their corporate strategy. While many studies focus on the "Why" of the radical change, few studies construct their analysis addressing the "How" of the 4IR, that being, how to optimally adopt 4IR within the current business landscape without significantly affecting business operations and investments. This study utilises secondary data analysis and desktop research as the research methodologies, with the information gotten from journals and relevant publications. Also, through the compilation of diverse business research studies and findings in the finance and information technology (IT) sectors, more light would be shed on the main argument of this study. The intended results of the study are meant to provide insights into how the wrong business strategy in the implementation of these technologies of the 4IR could result in dire outcomes. In conclusion, the study intends to find out how strategy is the mitigating factor for the effective implementation of 4IR technologies based on evidence presented.

Keywords Fourth industrial revolution · Artificial intelligence · Machine learning · 3D printing · Business strategy

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1 Introduction

The concept of the Fourth Industrial Revolution (4IR) is one that is utilised to describe the amalgamation of progressive and advanced technologies like the internet of things (IoT), Internet of Everything (IoET), Robotics, Big Data, Artificial Intelligence (AI), and 3D Printing, into several sectors such as the manufacturing sector, healthcare sector, etc. These technologies are transforming the way we interact, work, and live on a fundamental basis (Xu et al., 2018; Philbeck & Davis, 2018).

Technologies of the 4IR, especially in the cyber space are having a significant effect and impact on how businesses run their operations, and this has led to the development of new business strategies and models. The impact of these technologies on business strategies is far-reaching and profound. Companies across several industries are witnessing and experiencing major alterations in the way they run their operations, define their business models, and stay competitive in the relevant landscape. How the technologies of the 4IR are integrated enables businesses and organizations to run their processes effectively, improve and increase productivity, and develop innovative products and services (Van Wynsberghe, 2021).

One of the main impacts of 4IR technologies on business strategy is the ability to collect data, analyse this data, and leverage the data by discovering valuable insights. For instance, AI and machine learning (ML) models can process and extract insightful information from large amounts of data, giving companies and businesses the ability to make data-driven decisions, and create customised customer experiences. Reliance on data-driven outcomes have the potential to enhance operational efficiency, facilitate targeted marketing and sales strategies, and enable predictive maintenance (Javaid et al., 2021).

In addition, technologies such as automation and robotics play a vital role in transforming business processes and operations. Advanced robotics can automate repetitive and mundane tasks, resulting in increased accuracy, improved productivity, and reduced costs. Intelligent automation systems can optimise logistics, manufacturing processes, and supply chains, enabling companies to respond quickly and in a very swift way to changing market demands and improve overall agility.

The 4IR further eases the rise of novel business strategies and models. Some technologies such as blockchain render it possible to have transparent and secure transactions, getting rid of the need for intermediaries and revolutionizing several sectors such as intellectual property right, supply chain management, and finance. Furthermore, technology such as 3D printing leaves room for decentralised customization and production, having an impact on conventional manufacturing processes and presenting room for on-demand production. On the other hand, in addition to the transformative potential, the application of 4IR technologies results in challenges for businesses and organizations. Businesses need to adapt their skills, workforce, and organizational structures to position themselves suitably to effectively leverage these technologies and reap the benefits of their utilization.

With the adoption of 4IR technologies, other risks and factors must be considered. Addressing cybersecurity concerns and risks, and ensuring data privacy are vital aspects to consider in the digital age we live in. Additionally, very careful considerations are required when 4IR technologies are adopted and implemented, such as, ethical implication considerations related to automation, AI, and the future of work.

Finally, the technologies of the 4IR are revolutionizing business models and strategies across several industries. They present immense room for growth, efficiency, and innovation. On the other hand, businesses must embrace a holistic approach to effectively leverage these technologies. Being able to integrate and adopt 4IR technologies into business strategy will be a standout differentiating factor in the currently increasing competitive and digitally driven business landscape.

The rest of the paper is structured as such: in sect. 2, we briefly talk about some of the technologies in the cyber space of the 4IR, in sect. 3 we provide some information on business strategy, in sect. 4 we discuss and shed some light on how the 4IR drives business strategy, in sect. 5 we discuss some of the positive impacts on business strategy, and in sect. 6 we provide a conclusion and some suggestions.

2 Technologies of the Fourth Industrial Revolution

The Fourth Industrial Revolution (4IR) as previously mentioned comprises three different spheres being the cyber, physical, and biological spheres. Below, we briefly discuss some of the components of the cyber sphere, which is the sphere of interest in this study as illustrated in Fig. 1.1.

Fig. 1.1 Technologies of the 4IR

2.1 Artificial Intelligence (AI)

There are several definitions but no universally accepted definition of what Artificial Intelligence (AI) is, however, it is the simulation of processes and tasks that would otherwise require human intelligence, by machines. AI involves the design and creation of intelligent models and systems capable of learning from data, performing tasks, and making decisions. It is already being used in several industries, from finance to manufacturing and healthcare, improving accuracy and efficiency (Wang et al., 2022; Sestino & De Mauro, 2022; Ledro et al., 2022; Leke & Marwala, 2019).

There are three main types of AI, these being Weak AI or Artificial Narrow Intelligence (ANI), Strong AI or Artificial General Intelligence (AGI), and Super Artificial Intelligence (Aggarwal et al. 2022; Leke & Marwala, 2016; Ganesh & Kalpana, 2022). Weak AI models cater to providing solutions for mainly one task, while strong AI models can cater to providing solutions for multiple tasks and can utilise the knowledge learned and obtained from one task in another. Super AI models and systems are an order of magnitude more intelligent than human beings. The current state of research in the field of AI still points to us being some way off Super AI, though there is the existence of a lot of Weak AI systems and some Strong AI systems.

2.2 Machine Learning (ML)

Machine Learning (ML) is a subset of artificial intelligence that aims to create systems and models that learn from the data and information they get presented. The governing principle around the development of ML systems is, creating a model to perform a task (T), based on the experience (E) which it gets presented with in the form of data, and with the best possible performance (P) (Leke & Marwala, 2019; Mahesh, 2020; Wang et al., 2016).

There are four types of ML models and three phases involved in the creation of ML models. The three phases are: the training phase, the validation phase, and the testing phase. What is worth noting about these phases is the fact that the data used in these different phases are in no way similar, and there is no overlap in the contents of the datasets. The four types of ML models are supervised machine learning, unsupervised machine learning, semi-supervised machine learning, and reinforcement machine learning.

Supervised ML requires the use of data where both the inputs and the outputs are known. These models learn the interrelations and correlations between the inputs and the outputs. In the case of artificial neural networks (ANNs), for example, which are a type of supervised ML model, these interrelations and correlations are stored in the weights and connections of the network. Unsupervised ML requires the use of data where the inputs are known, but the outputs are not known. It is up to the model to extract patterns from the data and then determine what the output should be.

Semi-supervised ML comprises models which can make use of data with both the inputs and outputs known, and data with only the inputs known. Such models address a drawback which occurs in our day-to-day lives, being that existing data is of the form where the outputs are either known or unknown. The final type of machine learning is reinforcement ML which comprises models which are not trained using any data, but rather utilise a trial-and-error approach to learn and generate their own data and determine the best course of action.

2.3 Big Data

The concept of Big Data speaks to vast amounts of data generated on a day-to-day basis and in a variety of ways. Big Data can be utilised to analyse patterns and trends to be able to make better decisions (Shi, 2022; Li et al., 2022; Akter et al., 2016). Big Data is characterised by several Vs, and it started off with there being three Vs which are: Value, Volume and Velocity. It subsequently progressed to there being four Vs, and now it is at 10 Vs, being: Value, Volume, Velocity, Validity, Visualization, Variety, Variability, Vulnerability, Volatility, and Veracity.

What is worth noting about big data is the fact that it goes beyond just the data, but also includes the infrastructure utilised to store and process the huge amounts of data generated from several sources, such as Twitter, YouTube, and WhatsApp, and of varying types, such as text, numbers, photos, etc.

2.4 Internet of Things (IoT)

The Internet of Things (IoT) comprises the use of several devices and sensory objects to collect data from mechanical and physical objects and transmit this data over the internet. The data collected by these IoT devices can be utilised to improve efficiency and optimise operations (Koohang et al., 2022; Tan & Sidhu, 2022; Hassan, 2019). The data which gets generated by IoT devices contribute to Big Data. These devices are ideal to be set up in difficult to reach environments for human beings, like in an underground setting in a mine, or in a pipe network to monitor wear and tear.

2.5 Robotics

Robotics comprises the use of machines to perform functions that normally require human intervention and input, and that are either difficult for humans to perform or dangerous overall. The use of robots is evident in sectors such as the manufacturing sector where it has resulted in increased quality and productivity in addition to reduced costs (Garcia et al., 2007; Lynch & Park, 2017). There are several categories of robots in existence such as tele-operated robots, humanoid robots, and augmenting robots, to name a few.

3 Business Strategy

Business strategy describes a set of decisions and actions that are taken by a business to achieve its long-term objectives and goals. Furthermore, it can be a comprehensive plan that details how a business intends to develop and sustain a competitive advantage in the marketplace. Business strategy comprises several aspects, including being able to determine the business's vision and mission, being able to identify target markets, being able to define value propositions, and being able to allocate resources effectively (Rumelt, 1998).

A business strategy that is well-defined gives a roadmap for the business, directing its actions and shaping its decisions at both the operational and strategic levels. It also comprises analysing the external environment within which the business operates, including customer needs, competition, and market trends, as well as evaluating internal resources and capabilities. Based on findings from the analysis of the business model or strategy, businesses can mitigate risks, identify opportunities, and effectively position themselves in the market (Ghemawat, 2002).

Business strategy typically comprises multiple key elements, as seen in Fig. 1.2 below (Rumelt, 1998; Ghemawat, 2002; Massa et al., 2017).

- Vision and Mission**:** The mission states the purpose and reason for existence, while the vision outlines the intended future state of the business, these statements are there to provide a sense of guidance and direction to the strategic decision-making procedure.
- Goals and Objectives**:** Clear goals and objectives are set to define the business targets to be achieved. These can be market share goals, financial targets, customer satisfaction metrics, or other measurable outcomes.
- Competitive Analysis**:** Businesses analyse the competitive terrain to better comprehend their position in relation to competitors. This entails carrying out an evaluation of a competitors' strengths, weaknesses, and strategies to identify competitive advantage and opportunities for differentiation.
- Target Market**:** Being able to identify and understand the target market is very important for the development of effective business strategies. This comprises

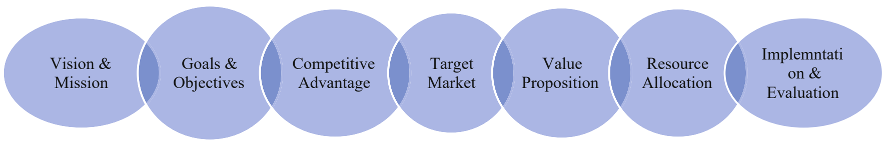

Fig. 1.2 Components of business strategy

selecting target markets, segmenting the market, and understanding the needs of customers and preferences within identified segments.
- Value Proposition**:** This identifies the unique value a business offers to customers. It presents the features, benefits, and value customers can expect to get from the business' services or products, demarcating it from competitors.
- Resource Allocation**:** Business strategy involves a determination of how resources are utilised, such as human capital, financial capital, and technological capabilities, and how they will be allocated to support the carrying out of the strategy. This comprises making decisions about resource deployment, investments, and other operational priorities.
- Implementation and Evaluation**:** Business strategy is not only concerned about planning, but it is also concerned about execution. Business strategy requires the translation of the strategic goals into actionable plans and the observing of progress towards achieving the set goals. It is essential that business strategy be regularly evaluated and adjusted to ensure the effectiveness of the strategy and to adapt to changing markets.

An effective business strategy provides a suitable framework for aligning resources, making informed decisions, and creating a competitive advantage. Businesses benefit from the right business strategy in terms of how they navigate uncertainties, drive sustainable growth, and capitalise on opportunities in a dynamic business environment.

4 How the 4ir Drives Business Strategy

The 4IR drives business by developing a data-driven organisation that maximises business value and incorporates a redefined business strategy that intends to leverage technology to achieve its objectives (Alsulaimani & Islam, 2022). This relationship is further depicted in Fig. 1.3.

Figure 1.3 clearly demonstrates how the 4IR transformation strategy drives growth, profitability, and sustainability. The strategic inflection point (SIP) depicts the period when the entity must respond to disruptive change in the business environment efficiently, or else, there would be a deterioration in operations. This is the crucial point where business is expected to make decisions at the onset of significant change.

This inflection point refers to the crucial stage in a company's performance where it is expected to make a significant change in its strategy to continue to be successful and profitable. The 4IR disrupts established business models, therefore, having an impact on business profitability. The relationship between the success and growth of an entity is closely linked to the entity's ability to swiftly adapt to change. However, a company that fails to incorporate 4IR transformation runs the risk of facing significant decline in profitability and growth (Trstenjak & Cosic, 2017; Lanteri, 2021).

This indicates that companies that manage and foresee strategic inflection points enhance their competitive edge. To execute strategic decisions based on the potential

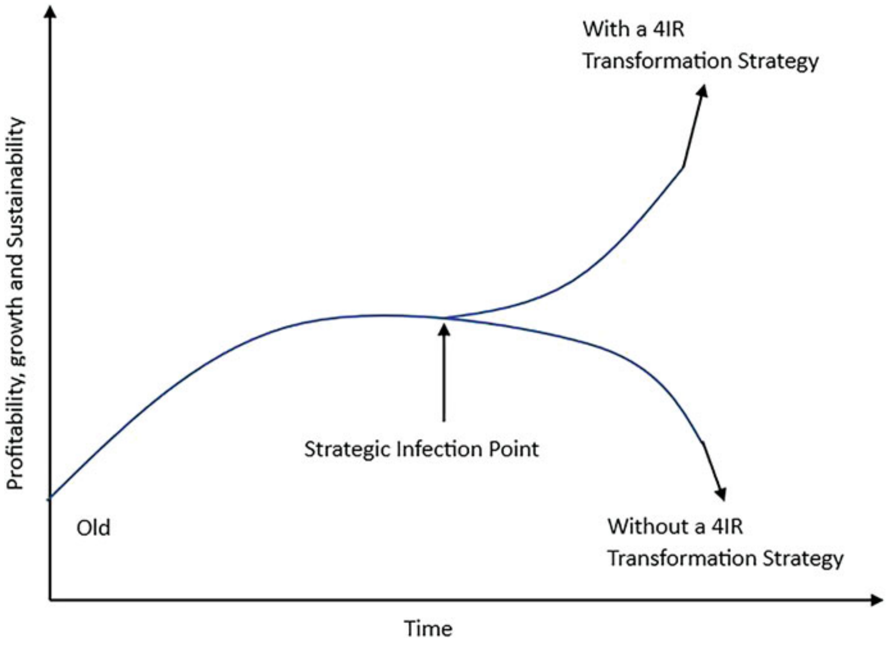

Fig. 1.3 Strategic Inflection Point (SIP) applied to 4IR. Source: (adapted from Philbeck & Davis, 2018)

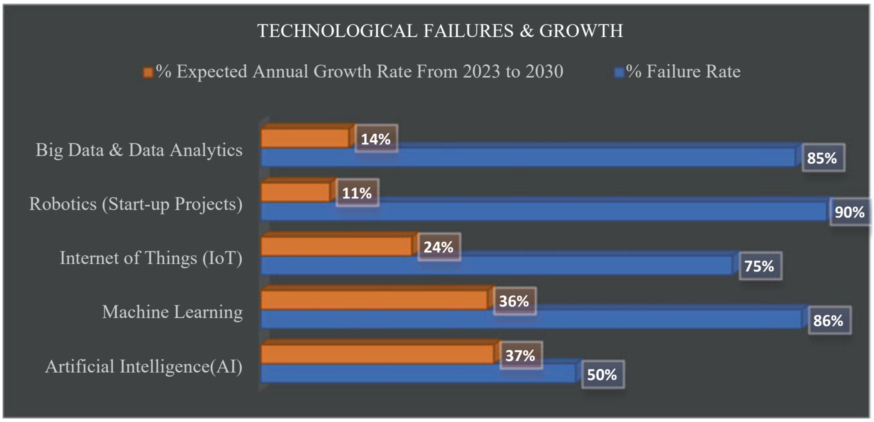

Fig. 1.4 Technological Failures and Expected Annual Growth

impact of the inflection point, businesses should further examine the significance of these disruptions on their business. To identify their significance, it is very important to assess the technological failures and how business can address these challenges to improve upon and better their growth (Igor Ansoff, 1987).

Figure 1.4 below depicts the failure rates of different technologies in the cyber space of the 4IR within the business landscape.

- Artificial intelligence (AI) in aggregate reported a 50% failure optimization rate. AI business failures are due to several reasons including lack of clear business objectives, insufficient investment, and poor data which negatively affect the performance of the AI algorithms and models (Rychtyckyj & Turski, 2008; Shaw et al., 2019; Westenberger et al., 2022). Albeit there is an anticipated annual growth rate of 37.3% for the next 7 years (Zhang et al., 2021).
- Machine Learning (ML) project failures as per the figure are up to 86% and there is depicted an expected annual growth rate of over 35% according to Compound Annual Growth Rate (CAGR) (Honig & Oron-Gilad, 2018).
- Internet of Things (IoT) failures as per the figure are reported to be up to 75%. This is due to the complexity of implementing and building IoT solutions, and as a result, not yielding the anticipated outcomes. However, the growth is expected to accelerate by 23.72% (Anandayuvaraj & Davis, 2022).
- As published by the International Journal of Performability Engineering (Kontogiorgos et al., 2020), the reliability of robot automation is at an average of 88%. However, industry experts as per studies, estimate more than 90% failures in Robotics start-up projects with the robotics projects expected to grow at a compounding rate by 10.5% from 2023 to 2030.
- Over 85% of Big Data projects fail due to the data not delivering the expected business outcomes. There is also a forecasted 13.5% of annual growth rate anticipated.

4.1 Reasons for Technological Failures

According to Gartner (Dunson, 2018), 40% of all business projects fail to achieve their targets, therefore, it is worth noting that technological failures can occur due to various reasons or a combination of factors. These drive the project optimization failures. We have identified four key drivers of failures, and they are:

- **Lack of clear objectives:**

For the project to realise the expected value or return to business, the purpose of the project should be clearly stated. Unclear business alignment and understanding of what the entity wants to achieve taints the primary objective of the project which leads to adverse results, missing target variable and disorganised implementation. 50% of software projects are mainly driven by unclear objectives. Businesses that focus only on the technical aspect of the project tend to not achieve the expected results.

- **Insufficient Investment:**

Capital constraints remain a significant driver of various project failures. 16% of Robotics start-up failures are due to technological glitches and failures due to lack of investment in cybersecurity measures. This indicates that without sufficient finances for technology, data and human resources, entities run the risk of not realizing meaningful results from the project.

- **Substandard Data Quality:**

These technological projects require and rely heavily on the quality and quantity of data available. Substandard data which includes inaccurate, partial, or biased data will negatively affect the performance of the technological model (Rosa et al., 2015). A study has reported that businesses that do not ensure their data is Machine Learning (ML) ready are more likely to fail, and 87% of data science projects never make it to production due to not having the right data (Kitsios & Kamariotou, 2021).

- **No Modification in Management Strategy:**

If management intends to optimise their projects, an accurate projection of how these projects will impact on their current existing business model should be completed. Most of the project failures trace back to the lack of sufficient planning and anticipation on how the project will work coherently with the current projects. If the management strategy is not modified or amended, then the expected results are likely to not be realised. A study reported that in 2022, only 20% of analytic insights delivered business outcomes as intended. This indicates that not only focusing on collecting the data and analyzing it is important, but the reason for the collection and analysis of the data is significant to achieve the expected results.

4.2 4IR Transformation Strategy

4IR transformation strategy is clearly a plan of action that outlines how business intends to leverage technology to achieve their business objectives. To achieve this, business should align the 4IR transformation to their existing business strategy which should include the following fundamental concepts as per Fig. 1.5 below:

4.3 Clear Business Alignment and Digital Transformation

This means a clear objective should be outlined and developing an overall strategy on how to utilise technologies such as AI, ML, Big Data, Robotics and IoT to achieve business strategy should be defined. This entails not only focusing on the technical aspects but on the purpose of the optimization as well, and this should be clearly defined and communicated to all stakeholders. This objective should not deviate from the initial vision and mission of the entity to be able to add value. As such, defining the reason for the optimization and identifying the business challenges is necessary to align it to the business and ensure the transformation is relevant to the

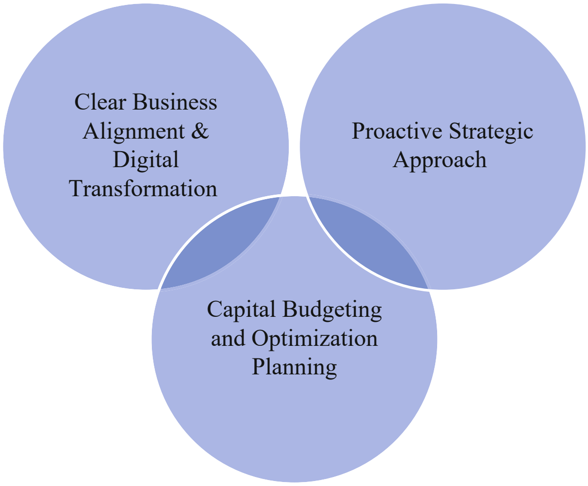

Fig. 1.5 4IR Transformation Strategy

business. This means developing a data management plan, which entails a detailed plan on how to collect, store and analyse the data to ensure data quality is maintained is crucial as it means the risk of having substandard data is reduced.

4.4 Capital Budgeting and Optimization Planning

Due to these projects requiring extensive capital and investment, it means that thorough capital budgeting, optimization planning and investing in the right technology should be part of the new transformed business strategy. This is considering that any incorrect adoption of these technologies will significantly impact on the business' going concern and its continuity. Therefore, for the project to be adopted, a comprehensive analysis on the capital required and its expected future returns should be included to decide whether the project is viable. This means that businesses should focus on the long-term benefits of the project as opposed to the short-term speculation which can deter the primary purpose of the investment.

4.5 Proactive Strategic Approach

The 4IR transformation has driven the significance of why business strategy should be adaptable to the current fast pace digital age, and proactively react to business challenges. So, this means a reformed business strategy for business should include a proactive strategic approach that ensures they consistently redefine their strategy as they go, utilizing the relevant data to optimise business results. Developing a business culture that is adaptive to change and fosters an innovative approach will be the way to go.

5 Impact on Business Strategy

The technologies of the Fourth Industrial Revolution (4IR) in cyber space have an impact on and transform the way businesses operate, which has resulted in the development of new business strategies and models. In Fig. 1.6, we outline some of the ways in which the technologies of the 4IR are having a positive impact on business strategy, and we subsequently discuss these in more detail.

5.1 Increased Efficiency

The use of the technologies of the 4IR like artificial intelligence, Internet of Things, and robotics is resulting in increased levels of efficiency in businesses in service sectors and manufacturing industries. The effect of this is businesses can find a suitable trade-off between the quantity produced and the resources utilised to do so. The roll-on effect of this is reduced costs and increased profitability.

5.2 New Business Models

The technologies of the 4IR are rendering it possible to develop new business strategies and models, such as subscription-based services and the sharing economy, here we look at the likes of Netflix or Amazon Prime. These new strategies and models are having a disruptive effect on conventional industry practices and are also creating new opportunities.

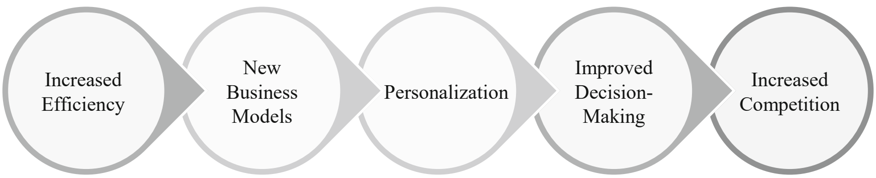

Fig. 1.6 Positive Impact of 4IR on Business Strategy

5.3 Personalization

The likes of artificial intelligence and big data are making it possible for businesses to personalise and tailor their products and services to individual customers. The result of this is businesses can better meet the needs of their customer base as well as improve customer satisfaction.

5.4 Improved Decision-Making

The use of artificial intelligence and big data are assisting and enabling businesses to make better decisions and yield improved outcomes based on the data obtained and analysed. The result of this is that businesses can identify patterns and trends that would otherwise not be obvious and would be difficult to detect (Munsamy & Telukdarie, 2021).

5.5 Increased Competition

The technologies of the 4IR are facilitating and making it easier for new market participants and market entrants. The entrance of new market participants results in increased competition. This forces businesses to be more innovative and agile with the target being to stay competitive.

In summary, by incorporating the following fundamental concepts, entities can develop a successful strategy and unlock their full potential to drive growth and success. This holistic approach involves revising your business objectives and developing a technology-driven plan to create value and remain relevant in the future.

6 Conclusion & Recommendations

It can be concluded with the above discussions that the 4IR technologies are significantly driving the future growth and sustainability of entities, and impact on how businesses run their operations which invariably leads to new business models and strategies being needed. Businesses that adopt the technologies of the 4IR are most likely to be more efficient, competitive, and profitable. It is, however, worth stating that these technologies bring with them challenges, such as the risk of system malfunctions, job displacements and losses, and the need to upskill the workforce. As such, businesses must be meticulous and careful in their consideration of the impact of these technologies on their operations. In addition, businesses need to develop business strategies that are right to assist them navigate the changes presented by these technologies.

The recommended strategic areas of focus within the business include Research and Development (R&D), Capital budgeting and Marketing divisions that require the extensive transformation and modification of their business models.

However, considering the shortfalls inherent to aligning this transformation to become relevant to business, entities should not merely adopt and re-strategise without a solid business proposition and data management plan. In the absence of these, adopting and implementing these technologies will not be a viable strategy.

Redefining a business strategy for the 4IR requires the revision of business objectives, developing a technology-driven plan and fostering an innovative culture that is highly driven by the 4IR disruptive change thereby driving future growth, profitability, and sustainability.

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Interaction between Fringe Benefits Values and VAT

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Abstract The main objective of this study was to seek certainty regarding the interaction between the value-added tax (VAT) implications of fringe benefits and their impact on the taxable values of such taxable fringe benefits for income tax purposes. Hence, the study investigated whether VAT should be included or excluded when the taxable value of fringe benefits for income tax purposes are determined. In 2019, a minor amendment was made to the opening words of section 23C(1) of the Income Tax Act (No. 58 of 1962), a section that links the VAT consequences of a fringe benefit to that of determining its taxable value for income tax purposes. However, the actual words applied in the Amendment Act do not align with the National Treasury's intention as described in its Explanatory Memorandum. This misalignment is the problem that the study aimed to address, highlighting the two possible approaches of interpretation: literal versus purposive. The methodology adopted was nested in the paradigm of interpretivism, whereby a qualitative research approach was employed by means of doctrinal research, supplemented by a basic comparative analysis of two different approaches of interpretation. The outcome of the study highlight an anomaly in the income tax consequences triggered by the application of section 23C(1), causing an unintended change in policy that has a negative impact on the taxable value of taxable fringe benefits. The paper makes recommendations to be considered by the legislator to rectify the identified anomaly, which could aid in providing certainty regarding the interaction between fringe benefit values and VAT.

Keywords Cash equivalent · Fringe benefit value · Income tax · Market value · Section 23C · Value-added tax

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1 Introduction

From a tax policy perspective, the most useful definition of a "fringe benefit" is that it constitutes a voluntary employer expense in the form of non-cash compensation (Turner, 2009). The term "fringe" could be defined as "on the edge", "at the border of" or "not part of the main", while the term "benefit" is described as "an advantage or a profit gained from something" (Tonkin, 2021, para. 2). Therefore, a fringe benefit should be understood as a non-cash benefit or advantage gained by an employee that does not form part of such employee's primary remuneration package.

Where an employer (or associated institution in relation to such employer) decides to grant a non-cash benefit or an advantage to its employee, such a supply could trigger income tax implications in the hands of the employee who receives such benefit. However, before such benefit could be subject to income tax, it first needs to qualify as a "taxable benefit" as defined and described in terms of paragraph 1, read with paragraph 2, of the Seventh Schedule to the Income Tax Act (No. 58 of 1962) (hereafter referred to as "the Act"). A taxable benefit constitutes a benefit, or an advantage, granted by an employer to an employee by virtue of such employee's employment at such employer, or for services rendered (or to be rendered) by such employee to its employer (Republic of South Africa, 1962).

Furthermore, it is important to note that any benefit received in the form of cash is specifically excluded from the scope of a taxable benefit and could therefore not trigger an income tax liability in terms of the Seventh Schedule to the Act. Even though employment benefits received for services rendered in the form of cash, such as cash salaries and cash allowances for travel and subsistence, will be excluded from taxable benefits, these will still be taxable, as they still qualify for inclusion in an employee's gross income in terms of special inclusion paragraph (c) of "gross income" as defined in section 1(1) of the Act (Republic of South Africa, 1962). Cognisance should be taken of the fact that instances do exist where a "no value" needs to be placed on a specific fringe benefit. However, all no value fringe benefits fall outside the scope of this paper, as they will have no output tax effect due to their value of supply being nil for value-added tax (VAT) purposes.

Special inclusion paragraph (i) under "gross income", as defined in section 1(1) of the Act, makes any fringe benefit taxable (irrespective of it being capital in nature or not) by regulating that its cash equivalent needs to be included in the employee's gross income (Republic of South Africa, 1962). The value of the cash equivalent of any type of taxable benefit will, in general, be determined by the application of the following formula: the private value of the benefit or advantage granted, reduced by any consideration given by the employee to the employer for such private use (South African Revenue Service, 2013). The value to be placed on "the value of private use" for application under the cash equivalent formula will however differ depending on the type of benefit or advantage that is being granted as a taxable benefit. Table 1 contains an overview of the different types of benefits or advantages that could be granted by an employer to its employee. Each of these is specifically

Table 1 Overview of the different types of fringe benefits regulated within the scope of the Seventh Schedule to the Act

Regulation provisions: Paragraph numbers	Description of type of benefit or advantage (fringe benefit)
2(*a*) & 5	Acquisition of an asset at less than its actual value
2(*b*) & 6	Right of use of any asset (other than residential accommodation or any motor vehicle)
2(*b*) & 7	Right of use of a motor vehicle
2(*c*) & 8	Meals, refreshments and meal and refreshment vouchers
2(*d*) & 9	Residential accommodation
2(*e*) & 10	Free or cheap services
2(*d*) & 10A	Residential accommodation treated as a low-interest loan
2(*f*) & 11	Benefits in respect of interest of debt
2(*g*), 2(*g*A) & 12	Subsidies in respect of debt
2(*i*) & 12A	Contribution to benefit fund
2(*j*) & 12B	Incurral of costs relating to medical services
2(*k*) & 12C	Benefits in respect of insurance policies
2(*l*) & 12D	Valuation of contributions made by employers to certain retirement funds
2(*m*) & 12E	Contribution to bargaining council
2(*h*) & 13	Payment of employee's debt or release of employee from obligation to pay a debt
16	Benefits given to relatives of employees and others

Source: Authors' compilation deduced from Seventh Schedule to the Act (Republic of South Africa, 1962)

regulated by different paragraphs contained under the Seventh Schedule to the Act as to what "value of private use" needs to be placed on it.

Apart from the income tax consequences that could be triggered in the hands of employees who receive a taxable fringe benefit granted by their employer (as indicated in Table 1), such a supply of a taxable fringe benefit could also trigger VAT implications in the hands of the employer if such employer is a registered VAT vendor. As section 23C of the Act plays a crucial role in linking the VAT consequences of a fringe benefit to that of determining its taxable value to be applied for income tax purposes, a review of the purpose of section 23C of the Act, as well as a historical review of the amendments that had been affected to section 23C of the Act, is presented next.

2 Literature Review

The purpose of section 23C of the Act is to prevent a double deduction for an income taxpayer who is also a VAT vendor. Section 23C ensures that the VAT (input tax) that has already been allowed to be claimed under section 16(3) of the VAT Act cannot be claimed again as a deduction for income tax purposes (National Treasury, 2001a).

Before 1 October 2001, section 23C of the Act only referred to the "cost" of an asset or "expenditure incurred" by a taxpayer, being silent on the scenario where, for example, a deduction in respect of an asset is not based on "cost", but rather on "market value". Uncertainty prevailed on whether VAT will be included or excluded from the "market value" if such market value is to be applied as the value of such asset for income tax purposes. To remove the latter uncertainty, section 23C of the Act was amended effective from 1 October 2001 to extend its application by the inclusion of the term "market value" within the ambit of this provision (National Treasury, 2001b). The Explanatory Memorandum that supported the latter amendment also clarified that if VAT (input tax) was allowed to be claimed upon the acquisition of such asset, the claimed VAT needs to be excluded from the market value of such asset.

After the former amendment, section 23C of the Act had been amended once more. Before its final amendment in terms of the Taxation Laws Amendment Act of 2019, the opening words of section 23C(1) of the Act read as follows: "*Where for the purposes of applying any provision of this Act*, regard is to be had to the cost to the taxpayer or the market value of any asset acquired by him . . ." (emphasis added) (National Treasury, 2019b, p. 30). Hereafter, the opening words of section 23C(1) of the Act were replaced, and currently still read as follows: "*Notwithstanding the Seventh Schedule*, where regard is to be had to the cost to the taxpayer or the market value of any asset acquired by him or her . . ." (emphasis added) (National Treasury, 2019b, p. 30).

The Explanatory Memorandum on the objects of the Tax Administration Laws Amendment Bill (TLAB) of 2019 set out the policy objectives which the TLAB aimed to achieve (National Treasury, 2019b). Under clause 26 of the Explanatory Memorandum on the 2019 TLAB (National Treasury, 2019b), the rationale and motivation for the 2019 amendment to section 23C(1) of the Act were provided as follows:

> In 2015, *Regulations dealing with "determined value" in paragraph 7(1) of the Seventh Schedule on retail value in respect of right of use of motor vehicle* came into effect. The proposed amendment in subsection (1) seeks *to align the policy intention as outlined in the Regulation* and clarify that VAT is to be included in the "*determined value*" used to calculate the fringe benefit arising in the employee's hands (emphasis added) (p. 56).

The phrase "to align the policy intention as outlined in the Regulation", encapsulated in the description of the rationale and motivation furnished by the National Treasury under clause 26 of the Explanatory Memorandum on the 2019 TLAB (National Treasury, 2019a, p. 56) in support of the reason why the proposed amendment to the opening words of section 23C(1) is required, effectively refers to the regulations as contained in Government Regulation 362.

This regulation was issued, and became effective on 1 March 2015, to assist in clarifying the uncertainties that prevailed regarding the value to be used as the "determined value" in determining the value to be placed on the "right of use of a motor vehicle" fringe benefit in different scenarios. Government Regulation 362 (National Treasury, 2015) clarifies that where any motor vehicle is manufactured, obtained or acquired or the right of use of any motor vehicle is obtained by the employer, the retail market value thereof for the purposes of items (a) and (c) of the definition of "determined value" in paragraph 7(1) of the Seventh Schedule to the Act will constitute, in respect of any year of assessment commencing on or after 1 March 2018, an amount equal to the "dealer billing price", which will represent an amount inclusive of VAT (National Treasury, 2015).

As the National Treasury's formulated policy objective to rationalise the reason behind the amendment of the opening words of section 23C(1) refers to the term "determined value" and uses the phrase "to align the policy intention as outlined in the Government Regulation", it seems that the legislator's intention behind this amendment was to only supersede the "right of use of a motor vehicle" fringe benefit above that of the provisions of section 23C. Hence, it seems as if the provisions of section 23C should only be subject to that of the taxable benefit regulated under paragraph 7 of the Seventh Schedule to the Act, and not to the rest of the taxable benefits as contained under the Seventh Schedule to the Act.

Therefore, it is questionable whether the National Treasury's rationale and motivation (as directly quoted above) in support of the need to amend the opening words of section 23C(1) of the Act are truly reflected in the outcome obtained when the new opening words of section 23C(1) (as introduced in terms of the latest amendment made to section 23C) are interpreted based on a literal approach of interpretation in comparison to the outcome it intended to derive based on a purposive approach of interpretation. Where different outcomes are derived from the interpretation of legislation based on a literal, as opposed to an interpretive approach of interpretation, such differences aid in creating and causing uncertainty among taxpayers in terms of how to correctly interpret and apply such legislation.

3 Research Question, Objectives and Contribution

The main aim of this study was to seek certainty regarding the interaction between the VAT implications triggered by the supply of fringe benefits and their impact on determining the taxable values of such taxable fringe benefits for income tax purposes. Therefore, the following research question was formulated for this study: Should VAT be included or excluded when the taxable value of fringe benefits is determined for income tax purposes?

In support of answering the research question, the following research objectives were set for the study:

1. To conduct a doctrinal analysis of the current legislation regulating both the VAT and the income tax treatment of taxable fringe benefits when granted by an employer (a registered VAT vendor) to its employee

2. To conduct a basic comparative analysis to illustrate two possible outcomes that could be derived from employing two different approaches of interpretation, namely the literal approach of interpretation (Case 1) as opposed to the purposive approach of interpretation (Case 2), to section 23C, which serves as the provision linking the VAT consequences of a fringe benefit to that of determining its taxable value for income tax purposes.

The study undertook to contribute by making a recommendation, based on the findings of the doctrinal and basic comparative analysis of different interpretations, that could provide better certainty regarding the interaction between fringe benefit values and VAT. More specifically, this recommendation could assist the legislator to address the anomaly on whether VAT should be considered when determining fringe benefit values in the hands of employees.

The remainder of this paper is structured as follows: First, the research methodological criteria employed in this study as the strategy for conducting the research are framed and motivated. This is followed by the doctrinal investigation to conceptualise and explain the working and requirements of the legislative provisions that are applicable on the supply and receipt of a fringe benefit under both the VAT Act (more specifically, sections 18(3) and 10(13)) and the Income Tax Act (more specifically, the provisions contained within some of the paragraphs under the Seventh Schedule to the Act) as well as section 23C of the Act, which serves as a link between the VAT Act and the Act. The latter will address Research objective 1. Next, to address Research objective 2, the findings deduced from the doctrinal analysis under Research objective 1 were applied to conduct a basic comparative analysis based on two different approaches of interpretation. The comparative analysis attempted to establish how the income tax implications triggered by the interpretation and application of the opening words of section 23C(1) of the Act, based on a literal approach of interpretation, compare to the income tax implications that were aimed to be achieved under the policy objective set by the National Treasury, which motivated the need for the opening words of section 23C(1) to be amended. Finally, the paper concludes by summarising the main findings in the context of both research objectives to answer the research question, make recommendations, acknowledge the limitations of the research, and suggest an area for further research.

4 Methodology

This study was nested in the interpretivist paradigm. Research positioned in the paradigm of interpretivism is a holistic approach towards research where analysis and evaluation of phenomena in its entirety endeavour to create new knowledge about the topic under investigation (Zuber-Skerritt, 2001). Henning et al. (2004) recommend that more than one research instrument be applied in the interpretive paradigm to create multiple dimensions of what is being investigated. Therefore, this research was based on the theoretical foundation of seeking to explain phenomena deduced from theory (described by Saunders et al., 2009 and (Stronach & MacLure, 1997) by doctrinally analysing the relationship between section 23C of the Act and the VAT Act to determine its impact on fringe benefit values for normal tax purposes based on two different approaches of interpretation. A qualitative research approach was employed by means of a doctrinal analysis and supplemented by a basic comparative analysis of two hypothetical cases. Each hypothetical case aided in highlighting and explaining the anomaly under investigation.

A doctrinal analysis was considered an appropriate research method for this study, as legislation is one of the typologies of legal research being described as a possible research paradigm in taxation research (Hutchinson, 2005; McKerchar, 2008). In addition, in the field of taxation, doctrinal research is commonly applied as a research method (Frecknall-Hughes, 2016; Viviers, 2021). A qualitative research approach supports the researcher in exploring the complexity of the research question to create a better interpretation or understanding (McKerchar, 2008).

The research was inductive in nature, as it applied both a literal and a purposive approach of interpretation. The literal approach of interpretation is described as the strict, or the letter-of-the-law interpretation, also referred to as the "black letter law" approach (Knight & Ruddock, 2008, p. 29). The "black letter law" approach is synonymous with doctrinal research and is typified by the systematic process of identifying, analysing, organising and synthesising statutes, judicial decisions and commentary (Hutchinson & Duncan, 2012). In support of the literal approach of interpretation, it was indicated in the English case *Cape Brandy Syndicate v IRC*, 1921(1) KB 64 that when interpreting a tax Act, one should merely consider what is clearly said. There is no room for any intendment or presumption, and nothing is to be read in or implied, as one can only look fairly at the language used by the Act.

In turn, Goldswain (2008) describes the purposive approach as the act of seeking and ascertaining the intention of the legislator by reading an Act as a whole and by placing it in the context of what is sought to be achieved (i.e. the policy objectives behind the legislation) and the relationship between the individual provisions of the Act. In terms of the latter approach, the researcher (and ultimately the taxpayer) is enabled to realistically question the interpretation of legislation where it is perceived to be unfair in circumstances where the result of its application does not seem to match the true intent of the legislator.

From judgements laid down in previous cases, it is evident that courts have departed from the ordinary effect of the words of the legislation to avoid the element of absurdity (such as an anomaly encapsulating uncertainty, inconsistency and ambiguity) and to give effect to the "true intention of the legislature" (Farrar's Estate v CIR, 1926 TPD 501; *M v COT*, 21 SATC 16; *Venter v R*, 1907 TS 910). By applying the "intention of the legislature" rule under the purposive approach of interpretation it is pivotal to clearly determine the legislature's policy objective (s) behind the enactment of a specific provision(s) and to ensure that its interpretation and application do not contradict such policy objective(s) (Glen Anil Development Corporation Ltd v SIR (1975) 37 SATC 319).

Where a mismatch is discovered between the result of the literal as opposed to the purposive approach of interpretation, an anomaly in the legislation exists. In other words, an anomaly occurs where the strict or literal interpretation and application of a specific provision(s) results in a deviation from what was to be expected when measured against the policy objective(s), true intent and rationale behind its legislative introduction. This deviation has been referred to in Shaler v The Master and Another, 1936 AD 136 (1936, p. 143) as the resulting "absurdity" because of ambiguities, inconsistencies and uncertainties that arise in the process of trying to interpret legislation.

5 Doctrinal Analysis

This section encompasses a doctrinal analysis of the legislative provisions of both the VAT Act and the Income Tax Act that could be trigged when an employer grants a taxable fringe benefit to its employee.

5.1 VAT Act Provisions

5.1.1 Section 18(3)

Section 18(3) of the VAT Act (Republic of South Africa, 1991) deems the granting by an employer (who is a registered VAT vendor) of a benefit or advantage consisting of the supply of goods or services to an employee (as contemplated in paragraph (i) of the definition of "gross income" in section 1(1) of the Act, read with the Seventh Schedule to the Act) to constitute a supply of goods or services made by such employer (vendor) that is deemed to be carried out in the ordinary course of its enterprise. However, the proviso to section 18(3) of the VAT Act determines that no deemed supply will be triggered to the extent that such advantage or benefit granted qualifies as (i) an exempt supply (as regulated under section 12 of the VAT Act), (ii) a zero-rated supply (as regulated under section 11 of the VAT Act) or (iii) entertainment (as defined in section 1 and regulated under section 17(2)(*a*) of the VAT Act).

Table 2 shows an evaluation of the different types of fringe benefits regulated under the Seventh Schedule to the Act to identify and justify which of these fringe benefits will not be subject to VAT (i.e. output tax) when they are supplied by an employer (vendor) to an employee.

Only those fringe benefits identified in Table 2 that could be subject to output tax upon their supply by an employer (vendor) to its employee (i.e. triggered by a deemed supply under section 18(3) of the VAT Act) formed part of the investigation under review in this study, which was aimed at seeking certainty regarding the interaction between fringe benefit values and VAT.

Table 2 Fringe benefits that will be subject to VAT upon their supply

Types of fringe benefits	Supply subject to output tax?	Reason why no output tax is levied upon its supply
Acquisition of an asset at less than its actual value	Yes	N/A
Right of use of any asset (other than residential accommodation or any motor vehicle)	Yes	N/A
Right of use of a motor vehicle	Yes	N/A
Meals, refreshments and meal and refreshment vouchers	No	Qualifies as “entertainment” as defined, hence input tax denied
Residential accommodation	No	Qualifies as the supply of a “dwelling”, which is an exempt supply under section 12
Free or cheap services	Yes	N/A
Residential accommodation treated as a low-interest loan	No	Qualifies as a “financial service” as defined, hence an exempt supply under section 12
Benefits in respect of interest of debt	No	Qualifies as a “financial service” as defined, hence an exempt supply under section 12
Subsidies in respect of debt	No	Supply of money is not a supply subject to VAT
Contribution to benefit fund	No	Qualifies as a “financial service” as defined, hence an exempt supply under section 12
Incurral of costs relating to medical services	Yes	N/A
Benefits in respect of insurance policies	No	Qualifies as a “financial service” as defined, hence an exempt supply under section 12
Valuation of contributions made by employers to certain retirement funds	No	Qualifies as a “financial service” as defined, hence an exempt supply under section 12
Contribution to bargaining council	No	Qualifies as a “financial service” as defined, hence an exempt supply under section 12
Payment of employee’s debt or release of employee from obligation to pay a debt	No	Qualifies as a “financial service” as defined, hence an exempt supply under section 12

Source: Authors’ compilation deduced from Seventh Schedule to the Act (Republic of South Africa, 1962) and the VAT Act (Republic of South Africa, 1991)

5.1.2 Section 10(13)

Section 10(13) of the VAT Act determines that the value of a deemed section 18(3) supply constitutes the amount equal to the cash equivalent (as determined under the Seventh Schedule to the Act) of the benefit or advantage granted to the employee. These cash equivalent values may need to be determined by applying the "market value" of such taxable benefits or the cost of such taxable benefits, depending on what type of fringe benefit the employee enjoys, as the Seventh Schedule applies different value rules to different fringe benefits.

The term "market value" is not formally defined in section 1(1) of the Act; however, it is generally accepted that the market value of an asset will represent the fair consideration that would apply between independent persons dealing at arm's length. In a VAT context, the term "open market value" is formally defined in section 1(1), read with section 3, of the VAT Act. Under section 1(1) of the VAT Act, it is indicated that the "open market value" in relation to the supply of goods or services means the open market value thereof determined in terms of section 3 of the VAT Act. In turn, section 3(1)(*b*) of the VAT Act states that the "open market value" of a supply of goods or services for VAT purposes shall include any tax charged (i.e. output tax) in terms of section 7(1)(*a*) of the VAT Act.

5.2 Income Tax Act Provisions

5.2.1 Provisions under the Seventh Schedule to the Act

The Seventh Schedule to the Act regulates the taxable value, which is referred to as "cash equivalent", to be placed on different types of benefits or advantages derived by an employee by reason of employment or the holding of any office. In essence, the granting of a fringe benefit by an employer to an employee could give rise to a taxable benefit in the employee's hands, which could make such employee liable for income tax on such benefit received. In terms of special inclusion paragraph (i) under "gross income" as defined in section 1(1) of the Act, the cash equivalent of any taxable benefit (as defined and determined by applying the various provisions of the Seventh Schedule to the Act) needs to be included in an employee's gross income for income tax purposes (Republic of South Africa, 1962).

5.2.2 Section 23C

Section 23C of the Act deals with the reduction of the cost or market value of certain assets. In terms of the taxability of fringe benefits, section 23C acts as the provision that interlinks the VAT consequences of an employer (vendor) on the supply of a fringe benefit to that of its value taxable in the hands of the employee receiving such benefit for income tax purposes.

An example of where an asset, or the right to use an asset, could be acquired at a value for income tax purposes equal to the market value of such asset is where a fringe benefit is received by an employee and where the Seventh Schedule determines that the value to be placed on such fringe benefit should be either the "cost to the employer" or the "market value" of such asset (e.g. the acquisition of an asset at less than actual value under paragraph 5(2) of the Seventh Schedule to the Act). As mentioned earlier in this paper, although the term "market value" is not formally defined in section 1(1) of the Act, it would generally represent the fair consideration that would apply between independent persons dealing at arm's length. Furthermore, uncertainty prevails regarding whether the market value of assets (and fringe benefits) for income tax purposes will include or exclude VAT.

In the context of fringe benefits, section 23C of the Act aims to clarify to taxpayers how the VAT consequences triggered in terms of the VAT Act upon the acquisition and/or supply of goods and services in the hands of the employer (vendor) will have an impact on the taxable value of such goods and/or services in the hands of an employee for income tax purposes. The latter argument is deduced from the current opening words of section 23C(1) of the Act, which read "Notwithstanding the Seventh Schedule" (Republic of South Africa, 1962).

The term "notwithstanding" is not formally defined in the Act. In ordinary English language, synonyms used for the term "notwithstanding" are "despite" or "in spite of", and its meaning could be further described as "not considering, or not being influenced by" (Cambridge Advanced Learner's Dictionary & Thesaurus, 2023). In a legal context, the term "notwithstanding" is commonly used in statutes and regulations to indicate that a specific provision or rule is not affected, or limited, by any other provisions or rules that may be contained in that same section or Act. Hence, the term "notwithstanding" is used to indicate that a specific provision or rule is intended to override, supersede or be given priority over that of other provision (s) or rule(s). Therefore, if, for example, clause 1 of a contract reads as follows: "Notwithstanding clause 2 . . .", it effectively means that clause 1 sets out the normal rule, while clause 2 of the contract creates the exception that will take precedence over that of the normal rule (Hossein, 2020).

Interpreting the former in the context of the regulation of the cost or market value of assets under section 23C of the Act, read with the provisions of the various paragraphs under the Seventh Schedule that regulate the determination of the taxable value (i.e. the cash equivalent) of various fringe benefits, it is deduced from the opening words of section 23C(1), "Notwithstanding the Seventh Schedule", that the provisions of the Seventh Schedule to the Act take presence above the value reduction rules for assets as contained under section 23C. Therefore, based on a literal approach of interpretation, it is concluded that the opening words of section 23C(1) are found to have an impact on the value of all taxable fringe benefits. This effectively means that the "cost" or "market value" of all assets, or the right to use such assets, granted by and employer (vendor) to its employee as a taxable fringe benefit will always include VAT, irrespective of what the actual VAT consequences of such assets were in the hands of the employer who granted such fringe benefit.

6 Basic Comparative Analysis

To explain and conceptualise the income tax consequences triggered by the current wording of section 23C of the Act for taxable fringe benefits (see Table 1) that are also subject to output tax (see Table 2) upon its supply by an employer (vendor) to its employee, two hypothetical cases of interpretation were analysed and compared. This comparative analysis aimed to highlight the anomaly caused by the interpretation and application of the current wording of section 23C regarding the taxability of a fringe benefit based on a literal approach of interpretation (Case 1), as opposed to a purposive approach of interpretation (Case 2).

The "acquisition of an asset at less than its market value" fringe benefit, as regulated under paragraph 2(*a*) read with paragraph 5 of the Seventh Schedule to the Act, was selected to form the basis of the scenario for the purposes of the basic comparative analysis between cases 1 and 2. This selection was deduced from the contents of Tables 1 and 2, in identifying a single fringe benefit that qualifies as a taxable benefit (deduced from Table 1) and that will also be subject to output tax (deduced from Table 2) upon its supply by an employer (vendor) to its employee.

6.1 Scenario

An employer (a registered VAT vendor making only taxable supplies) acquired a new computer at a fair consideration of R23 000 (including VAT) 3 years ago, which was used solely for purposes of its trade over the previous three-year period. The computer was then sold by the employer to one of its employees (a non-vendor) at a consideration of R4 600 (inclusive of VAT) at a time when the computer's market value amounted to R6 900 (inclusive of VAT). The advantage granted to the employee to acquire the computer at less than its actual market value was granted by virtue of the employee's employment at the employer.

6.1.1 VAT Analysis for Cases 1 and 2

For VAT purposes, the employer (vendor):

- would have been allowed to claim input tax upon the acquisition of the computer 3 years ago amounting to R3 000 (i.e. R23 000 × 15/115) (section 16(3) of the VAT Act); and
- will, upon the supply of the advantage to the employee, be deemed to make a supply to the employee (section 18(3) of the VAT Act) and must levy output tax on such supply based on the cash equivalent of the advantage granted to the employee (section 10(13) of the VAT Act). For the determination of the cash equivalent value of each case, see the separate income tax analysis of each case indicated below.

6.1.2 Income Tax Analysis for Cases 1 and 2

- The value to be placed on the "acquisition of an asset (computer) at less than its market value" fringe benefit shall be the market value thereof at the time the computer is acquired by the employee (paragraph 5(2) of the Seventh Schedule to the Act).
- However, now it is questionable whether the VAT is to be included in or excluded from the value of the fringe benefit for normal tax purposes of the item being supplied. Hence, should the value to be placed on the fringe benefit under the Seventh Schedule include or exclude VAT? The answer to this question is dealt with separately under each case below, as the answer is dependent on the type of approach of interpretation applied under each case.

6.2 Case Study 1

Analysis of the VAT implications and their related impact (if any) on the value of the fringe benefit for income tax purposes based on a literal approach of interpretation.

6.2.1 Income Tax Analysis

In applying the literal approach of interpretation to the opening words of section 23C (1), "Notwithstanding the Seventh Schedule" (Republic of South Africa, 1962), it means that section 23C(1) cannot be considered in establishing the fringe benefit value, as the entire Seventh Schedule is indicated to supersede (or to override) the provisions of section 23C.

This means that only the Seventh Schedule needs to be applied (and not section 23C) in addressing the question on whether the value to be placed on the fringe benefit for income tax purposes should include or exclude VAT. As the fringe benefit under scrutiny in this comparative analysis (namely the "acquisition of an asset at less than its actual value") is dealt with under paragraph 5 of the Seventh Schedule, the value according to paragraph 5(2) to be placed on this fringe benefit is the "market value" thereof as at the time it is acquired by the employee. However, the term "market value" is not formally defined for application in a Seventh Schedule context. Clause 33 of the Explanatory Memorandum on the Second Revenue Laws Amendment Bill (National Treasury, 2001a, p. 28) states: "It is contended that it is arguable that VAT should be included when determining market value, since it is usually included in the advertised price (see section 65 of the Value-Added Tax Act, 1991)."

Therefore, it is concluded that the cash equivalent value of the taxable benefit in the hands of the employee who receives the advantage by means of acquiring an asset (computer) at less than its market value will therefore be the market value inclusive of VAT, namely R6 900. Effectively, the value of the fringe benefit that is taxable in the employee's hands is inflated. Hence, the literal approach of interpretation applied to section 23C(1) has a negative impact on the value of the fringe benefit, as a value inclusive of VAT results in a higher taxable value, which in turn will result in a higher income tax liability in the employee's hands.

6.2.2 VAT Analysis

As the cash equivalent of the advantage granted to the employee under Case 1 was concluded to be R6 900, it means that the employer must levy output tax on the fringe benefit deemed supply equal to R900 (i.e. R6 900 × 15/115) (section 18(3) read with section 10(13) of the VAT Act).

6.3 Case Study 2

Analysis of the VAT implications and their related impact (if any) on the value of the fringe benefit for income tax purposes based on a purposive approach of interpretation.

6.3.1 Income Tax Analysis

In applying the purposive approach of interpretation to the opening words of section 23C(1), the words "Notwithstanding the Seventh Schedule" (Republic of South Africa, 1962) are now interpreted in the context of supporting the National Treasury's explanation for amending the opening words of section 23C(1), namely that these opening words are to be interpreted to mean that section 23C is only superseded (or overridden) by a single fringe benefit, namely the "right of use of a motor vehicle" fringe benefit regulated under paragraph 7 of the Seventh Schedule. As the fringe benefit under scrutiny in this comparative analysis (namely the "acquisition of an asset at less than its actual value" fringe benefit dealt with under paragraph 5 of the Seventh Schedule) is not a paragraph 7 benefit, the provisions of section 23C must apply (rather than the entire Seventh Schedule as under Case 1) in addressing the question on whether the value to be placed on the fringe benefit for income tax purposes should include or exclude VAT.

Consequently, section 23C(1) determines that if the taxpayer is a vendor and an input tax deduction was claimed, the amount of the actual input tax must be excluded from the cost or the market value of the asset or the amount of the expenditure (Republic of South Africa, 1962). Furthermore, if the taxpayer is a non-vendor and no input deduction was allowed to be claimed, the VAT portion must be included in the cost (or the market value) of the asset or the amount of the expenditure (Stiglingh et al., 2023).

Therefore, the market value should in this instance exclude VAT and will be R6 000 (i.e. R6 900 × 100/115). Effectively, the value of the fringe benefit that is taxable in the employee's hands is lowered. Hence, the purposive approach of interpretation applied to section 23C(1) has a positive impact on the value of the fringe benefit, as a lower taxable value will result in a lower income tax liability in the employee's hands.

Leading South African tax textbooks (that are nationally prescribed by leading South African universities and widely used by tax students as well as tax practitioners) also apply the purposive approach of interpretation in their explanatory examples to illustrate to the textbook users how section 23C needs to be interpreted and applied practically (Stiglingh et al., 2023).

6.3.2 VAT Analysis

As the cash equivalent of the advantage granted to the employee under Case 2 was concluded to be R6 000, it means that the employer must levy output tax on the fringe benefit deemed supply equal to R782.61 (i.e. R6 000 × 15/115) (section 18(3) read with section 10(13) of the VAT Act).

6.4 Conclusions Deduced from the Findings of the Basic Comparative Analysis

Deduced from the outcomes of the basic comparative analysis derived from the interpretation of the opening words of section 23C(1), based on a literal approach of interpretation (see Case 1), as opposed to a purposive approach of interpretation (see Case 2), it is evident that an anomaly exits regarding the outcome achieved when compared to the outcome it was intended to achieve. This results in an unintended change in policy that has a negative impact on the certainty regarding the interaction between fringe benefit value and VAT. De Koker and Williams (2011) advocate that where an anomaly in tax a system prevails, such as an anomaly highlighted in this paper, it is the task of the legislature to address it through the enactment of appropriate amendments.

7 Conclusions and Recommendations

In the quest of seeking certainty regarding the interaction between the VAT implications triggered by the supply of fringe benefits and their impact on determining the taxable values of such taxable fringe benefits for income tax purposes, the research question that this study attempted to answer was: Should VAT be included or excluded when the taxable value of fringe benefits is determined for income tax purposes?

Based on a qualitative doctrinal analysis, supplemented by a basic comparative analysis, an anomaly was found to exist, whereby the income tax consequences triggered based on a literal approach of interpretation of the opening words of section 23C(1) of the Act seem to be in contradiction with the income tax consequences it was intended to achieve based on a purposive approach of interpretation.

Deduced from the findings under Case 1, it is concluded that where a literal approach of interpretation is applied to the opening words of section 23C(1), the outcome results in a negative impact on the fringe benefit values, as a value (i.e. either cost or market value) inclusive of VAT (i.e. an inflated value) to be placed on the fringe benefit results in a higher taxable value, which in turn will result in a higher income tax liability in the employee's hands. It is submitted that it is highly unlikely that this negative impact could have been the true intention of the legislator when measured against the rationale provided for amending the opening words of section 23C(1).

In order to address this anomaly, and to prevent the negative and unintended impact the current opening words of section 23C(1) of the Act have on the taxable value of fringe benefits (similar to that proven under Case 1 of the comparative analysis), it is recommended that the opening words of section 23C(1) of the Act be amended by replacing them with the following words: "Notwithstanding the regulations under paragraph 2(b) and paragraph 7 of the Seventh Schedule to this Act." Such proposed replacement of the opening words of section 23C(1) of the Act (or something similar that will result in the same effect) is considered crucial in ensuring that the provisions of the Seventh Schedule to the Act only take precedence over the application of section 23C in respect of the "right of use of a motor vehicle" fringe benefit as regulated in terms of paragraph 2(*b*) read with paragraph 7 of the Seventh Schedule to the Act. Such replacement of words will assist in eliminating the current prevailing anomaly identified and will marry the outcome of the literal approach of interpretation to that of the outcome of the purposive approach of interpretation in the instance where the recommended new wording to replace the current opening words of section 23C(1) is to be interpreted. Another recommendation is to introduce a definition for the term "market value" to be applied in a Seventh Schedule context to all taxable benefits (other than those of paragraph 7 of the Seventh Schedule) to clarify whether in the instance where the value to be placed on any fringe benefit is to be the "market value", this "market value" should include or exclude VAT.

Finally, the proposed recommendations could aid in meeting the initially intended policy objective as was set by the National Treasury during 2019 when the opening words of section 23C(1) were amended, and could assist in providing certainty regarding the interaction between fringe benefit values and VAT.

8 Limitations and Suggestion for Further Research

It is acknowledged that this study was subject to limitations in terms of which its findings, interpretations and conclusions drawn are solely and inductively based on the views and interpretation of the researchers. Hence, this paper should be interpreted in the context of this acknowledged limitation.

It is submitted that a critical evaluation of the interpretation and application of section 23C of the Act, when measured against the fundamental principles of taxation, could aid in providing further certainty regarding the interaction between fringe benefit values and VAT. This is suggested as an area for further research.

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The Effectiveness of the Extended Accounting Academic Programmes: A Comparison with Mainstream Programmes

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Abstract The South African higher education institutions use extended academic programmes to afford access to high school graduates (matriculants) who would otherwise not meet the admission criteria in the regular academic programmes. In their first year, the students in an extended programme are registered for bridging courses meant to improve their readiness for the rigour of the regular academic programmes. This study investigates the effectiveness of extended programmes by focusing on the Extended Diploma programmes offered in the Accounting and Finance department at the Walter Sisulu University. Using an experiment approach, the throughput rates of the extended programme students are compared to the rates achieved by the regular diploma programmes. The study covers a period from 2014 to 2020 and data is obtained from the institutional records. The study hypothesized that due to the bridging courses offered in the first year, students in the extended diploma programmes perform equally well as students registered in the regular diploma programmes.

Keywords Extended academic programmes · Throughput rates · Accounting · Academic access · Dropout rates

1 Introduction

Education is globally accepted as an empowerment tool that improves social mobility and earning potential, especially in younger generations. This has resulted in governments promoting the massification of higher education as a means of sustaining socio-economic development. South Africa is amongst the world's most unequal societies, and hence the national government believes expanding access to higher education, especially to previously marginalised groups, is essential in eradicating the elitist system fortified by apartheid government (Lee, 2017). The South African

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White Paper 3 (A Programme for Higher Education Transformation) has been a leading guide to post-apartheid higher education transformation. This initiative sought to redress the inequality and social injustice created by the apartheid system by removing barriers to higher education. However, massification of higher education has a problematic vice in the form of low throughputs and high drop-out rates of students.

Massification has resulted in a more diverse student population in South African higher education institutions including underprepared students from disadvantaged black high schools (Harper et al., 2009). It also results in large classes (high students-to-lecturer ratios) which limit the quality of support that each student receives from the lecturer. As such, underprepared students, predominantly poor and black, struggle to successfully complete their academic programmes (Adetiba, 2019; Nhat & Bich, 2017). In efforts to balance the trade-off between access to higher education and success rates, the extended curriculum programmes (ECP) were introduced to provide support to underprepared students, especially in the historically disadvantaged institutions (Boughey, 2013).

According to the National Plan for Higher Education (Department of Education, 2001) certain students from disadvantaged backgrounds and schools are not sufficiently equipped and ready for higher education. Such students would need additional support and training to bridge the gap between high school and tertiary education. If enrolled in mainstream academic programmes, such students will either drop out or fail to complete their studies. Extended curriculum programmes are designed to ease these students into the rigour of mainstream programmes by offering an initial year of bridging courses. Underprepared high school graduates, especially from poor schools, are underprepared in mathematics and accounting skills due to their numerical nature (Byrne & Flood, 2008). This study investigates whether Accounting ECPs are effective in improving the success and graduation rates of underprepared students enrolled in these programs. The study focuses on data obtained from Accounting Diploma programmes at Walter Sisulu University in South Africa.

2 Literature Review

2.1 Extended Curriculum Programmes (ECPs)

ECPs are designed to foster a conducive and supportive environment that allows, otherwise, underprepared university students to 'mature' and progress in their studies (DHET, 2012). Research estimates that only 20% (2 in 10) of Grade 12 learners will successfully complete their tertiary qualification (Leshoro & Jacobs, 2019). ECPs exist to, not only improve access to higher education, but also to identify and incubate students deemed to be "at risk", of failure or dropping out, even before they commence their tertiary education (Van der Flier et al., 2003).

ECPs offer University accredited subjects and extend the duration of one's study by an additional year (Boughey, 2010). The first year is seen as a foundation phase that equips under-prepared students with, among other things, language and writing skills, reading, numeracy, life skills, and examination techniques (Levy & Earl, 2012). These support activities, interventions, and modules should enhance the probability of academic success. Levy and Earl (2012) found that students in ECPs benefited from increased access to lecturers and tutors who multiplied as academic and life mentors.

However, ECPs have their own set of disadvantages. For instance, there is the stigmatisation of ECPs at Universities, with students being classified as slow students (Du Pre, 2004). Students enrolled in ECPs are predominantly from poor or broken families and, as such, come with intrinsic and extrinsic barriers to learning. Intrinsic barriers include childhood trauma, chronic ailments, and mental challenges (Walton et al., 2009). On the other hand, extrinsic barriers include poor support and negative influences from family, school, and immediate community (Stofile et al., 2013). The extent to which ECPs adequately bring down these barriers to learning and improve success rates remains an empirical question.

2.2 Accounting ECP at Walter Sisulu University (WSU)

Walter Sisulu University (WSU) is a historically disadvantaged institution (HDI) located in the Eastern Cape province in South Africa. The province is the second poorest province in the country and is synonymous with poor infrastructure and ill-equipped schools that generally struggle to attract and retain talented teachers (Solilo, 2012). It has been observed that top performing matric graduates in rural areas and in poor provinces prefer to enrol in universities in better provinces such as Gauteng and Western Cape (Wiese et al., 2010). The remnants of the matric graduates, deemed underprepared by the so-called top universities, end up at HDIs such as WSU. Therefore, WSU finds itself serving underprepared students coming from disadvantaged backgrounds (Ntakana, 2011). Against this backcloth, it is imperative that support mechanisms such as ECPs be effective in enabling academic success for such students.

World over, higher education accounting curricula are undergoing serious changes in response to global calls for reform due to myriad of challenges in the business environment (Lubbe, 2017). Such challenges include complex business dealings and models, automation, and corporate governance scandals (Chabrak & Craig, 2013). This study investigates whether Accounting ECP offered by WSU assists under-prepared students to grasp the complexities of the accounting curriculum.

3 Methodology

The study is conducted using the quantitative method. The quantitative data of student cohorts that were enrolled from 2014 to 2020 is collected from the institutional records of Walter Sisulu University. We collect data for both the ECP (4-year duration) and mainstream (3-year duration) programmes in the Department of Accounting and Finance to allow for comparison between the two. The data is used to compare the throughput, dropout, and graduation rates from ECP against those in the mainstream studies. The data is used to track the progress of students within the minimum time as well as along the allowed time to complete.

4 Results

4.1 Retention, Graduation, and Dropouts

Data on enrolment and attrition rates in the two programmes are juxtaposed in Table 1 (ECP) and Table 2 (mainstream) below.

Table 1 Student attrition in ECP

Cohort (Year of initial enrolment)	Number enrolled	Still registered after 4 years	Dropouts	Graduated in 4 years (minimum time)
2014	92	15	90 *(98%)*	1 *(1%)*
2015	198	53	53 *(27%)*	106 *(54%)*
2016	83	31	35 *(42%)*	26 *(31%)*
2017	69	44	26 *(38%)*	35 *(51%)*
2018	69	31	9 *(13%)*	55 *(80%)*
2019	82	17	9 *(11%)*	63 *(77%)*
2020	25	1	2 *(8%)*	

Table 1 presents data on how students fare during the 4 years of their ECP studies. A 2014 cohort graduates from the programme in 2017 (4 years)

Table 2 Student attrition in the mainstream programme

Cohort	Number enrolled	Still registered after 3 years	Dropouts	Graduated in 3 years (minimum time)
2014	362	8	92 *(25%)*	207 *(57%)*
2015	301	17	60 *(20%)*	187 *(62%)*
2016	255	16	64 *(25%)*	160 *(63%)*
2017	261	9	51 *(20%)*	166 *(64%)*
2018	340	9	82 *(24%)*	224 *(66%)*
2019	281	1	49 *(17%)*	214 *(76%)*
2020	119		4 *(3%)*	114 *(96%)*

Table 2 presents data showing how students fare in the 3-year mainstream programme

Table 1 exhibits data on the ECP programme for cohorts enrolled in each of the years from 2014 to 2020. The minimum duration of the programme is 4 years inclusive of the first-year foundational work. The table shows how many students were initially enrolled, how many remain in the programme after the minimum duration, how many dropped out during the 4 years and how many graduated at the end of the 4 years. The dropout rate of the 2014 cohort is an outlier (98%) and could be because of students being migrated to another programme. The average dropout and graduation rates in the ECP are 34% and 49% respectively. This means that more than 3 in 10 students that enroll in the ECP would have dropped out by the fourth year of the programme, while 5 in 10 of those enrolled will graduate in record time. By deduction, 2 in 10 of enrolled students will not finish the programme in record time (4 years).

Table 2 shows comparative data for the mainstream programme. Graduation rates in this programme are higher than in the ECP, averaging 69%. This means about 7 in 10 students enrolled in the mainstream programme will graduate in record time (3 years). The dropout rates are also lower in the mainstream programme, 19% compared to 34% in ECP. This means only 2 in 10 students enrolled in the mainstream programme will drop out by the end of the 3 years. Deductively, only 1 in 10 registered students will not complete the study in the minimum time of 3 years.

4.2 *Dropout Rates*

Table 3 shows the rates at which students in the two programmes drop out during the different years of their studies. The data records that no dropouts occur in the first year of both programmes. However, in the second year (the first year of ECP students being integrated in the mainstream), an average of 22% of enrolled students drop out of the ECP while 13% drop out of the mainstream. After the second year, the dropout rates in the ECP and mainstream programmes are quite similar, 4% and 6% in the third year (final year for the mainstream), 8% and 7% in the fourth year (final year for ECP), 5% and 2% in the fifth year, and 2% and 1% in the sixth year.

Table 3 Comparative dropout rates

Year of study	Dropout rate (ECP)	Dropout rate (Mainstream)
1st	0%	0%
2nd	22%	13%
3rd	4%	6%
4th	8%	7%
5th	5%	2%
6th	2%	1%

Table 3 compares how and when students drop out of their ECP or mainstream academic programmes

The results show that the second year of both programmes is the bottleneck year with more students likely to drop out in this year. For ECP students, it seems the process of being integrated into the rigour of mainstream and the reduced levels of support adversely affect their chances of success. Studies highlight the stigmatisation of the ECP, and this could also impact on the dropout rates (Megbowon et al., 2023). However, those that overcome the odds in the second year are more likely to graduate as shown by the low dropout rates in the preceding years.

The data also shows that students who fail to graduate in record time (4 years) still face the risk (albeit very low) of dropping out. For the ECP, 5% of the initially enrolled students will drop out in the fifth (5th) year of their study, while an additional 2% will drop out in the sixth year. Comparatively, an average of 7% of the enrolled students will drop out in the fourth year (a year after the minimum time) in the mainstream programme. An additional 2% and 1% drop out in the fifth and sixth year of the programme.

4.3 Throughputs

Table 4 presents data on the throughputs achieved by the two programmes. The ECP has a minimum duration of 4 years and at that point, an average throughput rate of 45% is achieved. This means 45% of the cohort successfully complete the programme in the minimum time allowed. This is slightly lower than the 69% achieved by mainstream students after 3 years in the programme.

Students that do not complete their studies are allowed extra years (up to the maximum duration) to do so. After one (1) additional year, the average throughput rate for the ECP jumps up to 51% while there are no changes in the mainstream rate. The throughput rates move up to 52% in the second additional year (sixth year) in the ECP but does not change in the mainstream. Thus, this study finds that after 6 years the throughput rates are 52% and 70% for the ECP and mainstream programmes respectively.

Table 4 Throughputs in the ECP and mainstream programmes

	ECP	Mainstream
Minimum duration	4 years	3 years
Year of study		
3rd		69%
4th	45%	69%
5th	51%	69%
6th	52%	70%

This table presents the comparative throughput rates achieved in the ECP and mainstream programmes

5 Conclusion

The ECP is designed to provide access to higher education to underprepared students that would otherwise not be accepted in the mainstream programme. On average, 90 students are enrolled in the Accounting ECP programme. Our analysis shows that about 52% (69% for the mainstream) of these students will eventually finish their studies while 45% (69% for the mainstream) finish within the prescribed time.

Around 22% of ECP students drop out in the year they are integrated into the mainstream programme (second year of the ECP). On the contrary, no dropouts are recorded in the first year of the mainstream programme. However, ECP students that remain after this integration year will have better chances of completing the programme than their mainstream counterparts. For instance, when dealing with their second-year studies, mainstream students will drop out of the programme at an average rate of 13%. This is much higher than the 4% recorded in the ECP students going through the same level of study. Thereafter, the dropout rates are generally similar in the two programmes. This suggests that the ECP does help move students toward academic maturity and resilience albeit delayed, since the drop out in the previous year (second year) is high.

But why does this mental toughness not kick in during the year of integration into the mainstream (second year of ECP). Studies have argued that ECP students face several challenges including stigma, lack of confidence, and lack of academic and moral support (Megbowon et al., 2023). This might explain why more students drop out of the ECP once the comforts and support from the foundational year are removed.

6 Recommendations

The ECP is a transformational programme that promotes equality by giving access to students that would otherwise be judged undeserving of higher education. However, these students struggle in the later years of their study when the support given in their first year is withdrawn. This study recommends that more support is needed in the second year of the programme and be gradually removed. This support must be included in the costing of these programmes for funding purposes. This study was solely based on quantitative data and misses out on softer issues that could be discovered if qualitative data was used. A mixed method study is thus recommended.

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Municipal Standard Chart of Accounts and Financial Management Performance of South African Municipalities

Obert Matarirano, Abor Yeboah, and Trust Chireka

Abstract Despite many attempts to reduce and eliminate unauthorised, irregular, fruitless and wasteful expenditures (UIFWE) in municipalities, the phenomenon, on the contrary, has been on the rise. The most recent attempt was the introduction of municipal Standard Chart of Accounts (mSCOA) in 2017, which is implemented digitally through a computer-based system. Despite its implementation, UIFWE have, however, continue to be on the rise. This study assesses the effects of mSCOA on the UIFWE incurred by South African municipalities. To achieve this, data was mined from Auditor General of South Africa's reports, from 2015–16 financial year to 2021–22 financial year, and trend analysis and descriptive statistics used to analyse the data. Analysis of the data mined could not prove any effect of mSCOA on UIFWE. Since the implementation of mSCOA, there has been an increased trend in UIFWE incurred by municipalities. It seems program preconditions such as the complexity of mSCOA, complexity of government structures, political interference and municipal cultures, have significant impact on effects of mSCOA on UIFWE. Concerted efforts are required from every member of the governmental ecosystem if benefits from such a well-designed program are to result in improved financial management and good service delivery. Policymakers are advised to consider enablers and constraints of interventions before implementation, if they are to be successful.

Keywords municipal Standard Chart of Accounts · unauthorised, irregular and fruitless and wasteful expenditure · Municipalities · Trend analysis · Preconditions

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1 Introduction and Background

Performance of most South African municipalities has been often considered to be poor (Managa, 2012; Mello, 2018; Mishi et al., 2022; Odeku, 2019). Terms that have been used to describe South African municipalities include mismanagement (Mishi et al., 2022), maladministration (Thusi & Mashabela, 2023), nepotism (Hungwe & Mukonza, 2023), corruption (Breakfast et al., 2019), cadre deployment (Mlambo et al., 2022) and lack of accountability (Matebese-Notshulwana & Lebakeng, 2020) amongst others. One of the signs of poor performance has been the ever-increasing unauthorised, irregular, fruitless and wasteful expenditures (UIFWE) in municipalities have been a recurring phenomenon for quite some time (Enwereji & Uwizeyimana, 2019). Municipalities continue to incur UIFWE despite several interventions being put in place to curb them. Chief among them is the Municipal Finance Management Act (MFMA) which provides guidelines on how finances should be managed (Zindi & Sibanda, 2022). The MFMA prescribes that any official of the municipality who made or authorised UIFWE be liable for that expenditure (Munzhedzi, 2016). The MFMA places the municipal manager as the custodian of the MFMA and holds him/her accountable for UIFWE (Khaile et al., 2021). Other interventions include the national clean audit task team under the Hawks, which focused on municipal financial misappropriation; the Standing Committees on Public Accounts (SCOPA) which was supposed to ensure effective and efficient use of public funds and the Municipal Public Accounts Committees (MPACs) which was instituted to have oversight functions on municipal executives (Enwereji & Uwizeyimana, 2019).

Dzomira (2017) defined unauthorised expenditure as expenditure that municipalities incur without provision for it in the council-approved budget or which does not meet the conditions of a grant. He went on to define irregular expenditure as expenditure that was not incurred in the manner prescribed by legislation whilst fruitless and wasteful expenditure was defined as expenditures made in vain and that would have been avoided had care been taken (Dzomira, 2017). Such expenditure includes interest, the payment of inflated prices, penalties and late payment of creditors or statutory obligations, payments made for services not utilised or goods not received and the cost of litigation that could have been avoided (AGSA, 2017).

Researchers in the field of municipal performance have identified a multitude of factors behind the increasing trend in UIFWE. These include, among others, lack of accountability, corruption, political-administrative interface, insufficient human resource capacity, intergovernmental relations and institutional environment (Brown, 2020; Chitimira et al., 2022; De Visser, 2018; Munzhedzi, 2020; HSRC, 2022; Sutcliffe & Bannister, 2020). What is worrying is that these factors were raised more than a decade ago by authors including Bogopa (2013); Davids (2011); Laubscher (2012); Managa (2012); Mantzaris (2014); Mantzaris and Pillay (2014); Manyaka and Nkuna (2014); and Matsiliza (2013). This implies that interventions implemented between earlier and recent studies did not have meaningful effect on reducing UIFWE and improving financial management performance.

Table 1 Change in UIFWE since implementation of mSCOA in 2017

Expenditure	Percentage change
Unauthorised	82%
Irregular	40%
Fruitless and wasteful	246%
Overall	62%

Source: Auditor General reports, 2018/19 to 2021/22

New on the list of interventions to improve municipal performance is municipal standard chart of accounts. This was a product of claims that a single accounting system for local government departments would permit centralised planning and budgeting, as well as the capacity to observe the expenditure of funds centrally (AGSA, 2017; Dzomira, 2017). Such a reform would enhance financial discipline, improve efficiency, transparency, and accountability in use of public resources (Dzomira, 2017). The municipal standard chart of accounts (mSCOA) was introduced to improve public accountability and financial reporting (National Treasury, 2015) and thus, reduce UIFWE and improve financial management. Despite the theoretical benefits of mSCOA, the amount of UIFWE seem not to be slowing down since its implementation on the first of July 2017, as portrayed in Table 1.

Table 1 portrays an increase in all variables of UIFWE, with fruitless and wasteful expenditures increasing by over 240%. The incurrence of these expenditures is a product of mismanagement of financial resources (Glasser & Wright, 2020) and as such it is a sign of misuse of taxpayers' and ratepayers' money, which is associated with poor financial management performance (Mishi et al., 2022). Matebese-Notshulwana and Lebakeng (2020) argue that incurrence of UIFWE has prevented the reduction of social inequalities which has undermined social cohesion.

It is against this background that this study, using descriptive statistics, attempts to establish the effects that mSCOA has had on financial performance of municipalities, since its implementation on the first of July of 2017 (Brown, 2020). UIFWE was used as a proxy for financial management performance of municipalities. This proxy was selected because the Auditor General of South Africa (AGSA, 2022) links incurrence of UIFWE to financial management performance of municipalities. To this end, the objective of the paper was to establish whether mSCOA has had some influence on unauthorised, irregular and fruitless and wasteful expenditure, from the time it was implemented in 2017 until 2021–22 financial year. Using the data generated by the Auditor General of South Africa, trends in UIFWE were created using Microsoft Excel. The study found no evidence of reduction in UIFWE, thus no improvement in financial management performance of municipalities during the period in study. These findings provide a basis for future studies as currently no study was carried out on evaluation of effects of mSCOA in South African municipalities.

2 Literature Review

2.1 Theoretical Grounding

Most studies in the performance of municipalities have used the agency theory (Dzomira, 2017; Enwereji, 2022; Enwereji & Uwizeyimana, 2019; Khaile et al., 2021) and the stewardship theory (Majam, 2022; Msindwana & Ngwakwe, 2022) to explain the relationship between municipal administrators (MAs) and the citizens. The agency theory focuses on the relationship between the principal and the agent, where the agent carries out the interests of the principal (Davis et al., 1997; Khaile et al., 2021). In municipalities, the agents are the MAs whilst the citizens are the principals (Dzomira, 2017). On the other hand, the stewardship theory focuses on the idea that MAs prioritise needs of their communities by applying their knowledge, skills and expertise to make decisions the uplift their communities (Majam, 2022). These two theories were created for corporate organisations where the primary goal is to maximise wealth of shareholders (Ross et al., 2019). Local government organisations are, however, complex and actions of MAs are influenced by many, at times, conflicting factors (Davids, 2011). For these reasons, the study adopted the Social Realism Theory (SRT) to explain the performance of MAs, who are agents of the citizens. This theory was selected because it goes beyond intrinsic factors in explaining the decision-making process of the MAs.

2.2 Social Realism Theory

Social Realist Theory, which was coined by Margaret Archer, is an extension of Critical Realism Theory (CRT) which argues that there are three stratified layers of realism which include the empirical layer where experiences and observations occur, the actual layer where events occur and the real layer which comprise mechanisms that mediate events and eventually, experiences. The real layer is where invisible and intangible mechanisms are located and it is these mechanisms that give rise to events which lead to experiences and observations (Bhaskar, 2002; Boughey & McKenna, 2021; Luckett, 2011). CRT enables us to understand that our experiences emerge from a layer of reality where mechanisms exist, whether we are aware of them or not (Boughey & McKenna, 2021).

SRT focuses on the Real layer of CR by subdividing it into the domains of structure, culture and agency. It enables the examination of events and experiences by considering the relationship between social structures and people (agency). The social structures are decomposed into the two realms of structure and culture. Structures distribute access to material resources and organise relations in societies (Boughey & McKenna, 2021; Case, 2015). Culture includes the world of ideas, beliefs, myths, opinions (Case, 2015) as well as values, and concepts and theories (Boughey & McKenna, 2021). Agency is the domain of human interaction and the exercising of powers vested in humans, as individuals or groups (Case, 2015). Basing on this theory, the performance of municipal administrators is a function of their personal agency as mediated by social structuring and cultural conditioning (Luckett, 2011). Unlike the agency theory, factors behind low municipal performance, as seen by high levels of UIFWE, are explained by agency of administrators as influenced by structures and culture. It is not possible to talk about agency without referencing to the structural and cultural factors driving that agency.

2.3 Factors Affecting UIFWE

As discussed before, the exercise of duties by municipal administrators is impacted and conditioned by social structures and cultures, mostly beyond their control. The following sections discuss these factors.

2.3.1 Structural Factors

Weak control environment: The weak municipal control environment (Moloi, 2018) does not encourage efficiency. On the contrary, it promotes municipal administrators not to be committed to their custodianship roles and ignore their accountability duties (Myeza et al., 2021). Accountability is critical for effective running of municipalities, without it, it is difficult for MAs to take full ownership of their actions (Chitimira et al., 2022). Lack of commitment (Myeza et al., 2021) and a disregard to law (Odeku, 2019) contribute to the poor state of public accountability. Most of the challenges associated with public accountability are not a result of lack of appropriate policy frameworks, but lack of appropriate implementation of existing policies fostering public accountability (Munzhedzi, 2016; Sutcliffe & Bannister, 2020). Sutcliffe and Bannister (2020) argue that lack of accountability and transparency in municipalities has caused corruption and maladministration to be prevalent and deeply rooted in some municipalities. This argument is also echoed by Mbanyele (2021) who adds that accountability structures that are not credible and individual agency characterised by impunity have enabled corruption.

South African municipalities lack accountability procedures, despite MFMA prescribing perpetrators to be held liable for maladministration (Odeku, 2019). To make matters worse, there is a lack of commitment to hold those implicated in wrongdoing accountable for their actions (Munzhedzi, 2016). The lack of holding municipal officials accountable for maladministration is a huge concern in municipalities and this lack of consequence management can be attributed to an inadequate institutional environment and culture, and skilled leadership (Moloi, 2018). The insufficient implementation of consequence management, including partial application, leads to low morale, high staff turnover and poor performance (HSRC, 2022). Khaile and Davids (2020) argue that council oversight committees, which are meant to instil accountability, are made of members who are part of politically divided councils. They further argue that political decision-making is not informed by rationality but rather by party political mandate. As a result, committee members are partisan in practice which compromises accountability. The political infighting at national level which results in issuance of directives and threats and firing of councillors also weakens the control environment. Infighting within parties as well as coalitions in municipalities results in poor performance of municipalities (Mbanyele, 2021).

Other factors resulting in weak control environment cited in literature, including poor monitoring and oversight measures, lack of political will (Chitimira et al., 2022; Sutcliffe & Bannister, 2020) weak ethical systems, poor implementation and monitoring of supply chain management systems and policies, lack of well experienced administrators (Zindi & Sibanda, 2022); ineffective internal control tracking, nepotism in appointments, and inability of management to enforce consequences (Moji et al., 2022).

Human resources: A report by HSRC (2022) claim inadequate human resources, skilled leadership, and skilled employees as some of the constraints to proper municipal administration, a claim also supported by Munzhedzi (2020) and Sutcliffe and Bannister (2020). The report goes on to claim that most municipalities have high vacancy rates, high staff turnover, incompetent staff and several appointments in acting positions (HSRC, 2022). The challenge of unskilled human resources is associated with municipalities that struggle with finances as they are unable to attract and appoint people with the skills required (Hungwe & Mukonza, 2023; Moloi, 2018). Another factor cited for poor human resources is the inability of municipalities to recruit suitable personnel due to the weak control environment, which is unattractive for professionals (Sambo, 2019).

Politics: The support from the government and/or politicians is required to enforce the relevant municipal policies and drive good service delivery in any municipality (Chitimira et al., 2022). Unfortunately, there is a lack of political will to support good municipal administration (Munzhedzi, 2020). The interference of politics, which De Visser (2018) and Sutcliffe and Bannister (2020) referred to as political-administrative interface, means that political interests are prioritised over to needs of the communities (Chitimira et al., 2022). At the political-administrative interface, politicians (councillors) behave as if they are administrators whilst administrators behave like they are politicians (De Visser, 2018). Conflation of roles where some municipality officials occupy political and administrative roles also affects municipal administration. This is because decision-making process may be politically influenced rather than being influenced by the needs of communities (Mbanyele, 2021).

Due to political interference, cadres are appointed in key municipal positions without meeting minimum competency levels and critical skills required for their positions (Mbanyele, 2021). According to Magagula et al. (2022), cadre deployment in key municipal positions has a major contribution to the shortage of skilled personnel. In addition to unskilled leadership and personnel running municipalities, the relationship between the political and administrative leaders has a negative impact on performance of municipal officials as political appointments in leadership positions create frustrations among municipal employees (HSRC, 2022).

The unwillingness of municipal councils to exercise their oversight roles claimed by Khaile et al. (2021) might also be explained by political interference. As the mayor of a municipality is a political appointee, who also acts as a municipal administrator, his or her decisions might go unquestioned due to political alliances. The unwillingness of councils to question decisions may be to protect their political alliances or their own source of income (De Visser, 2018). De Visser (2018) claims that the substantial remuneration of councillors fortifies party discipline, falling out with the party is about more than an ideological rift but also means risking loss of the only income.

Intergovernmental relations: The other reason cited for poor performance in municipalities are the relations between different levels of government. Brown (2020) found that agenda for lower levels of government such as municipalities, are set at higher levels (national government) and lower governments are expected to implement policies they had no part in their formulation. Intergovernmental forums that are meant to be consultative, are rather informative. He claims that needs for local government are not considered when regulations are implemented. De Visser (2018) provides a similar argument that national and provincial governments do not work in tandem. There is lack of coherence between national and provincial governments and municipalities often find themselves at the receiving end of such incoherent laws and policies. This is a consequence of turf wars between the two governments or simply not working together (De Visser, 2018).

2.3.2 Cultural Factors

Corruption: The lack of accountability and poor control environment have promoted corruption, fraud and maladministration, especially in the tender processes (Chitimira et al., 2022). Municipalities award contracts to employees, councillors, close family members or other state officials (Bendle & Hollands, 2015). Despite being directly related to fruitless and wasteful expenditures, corruption has led to many other indirect causes such as employment of people who do not have the minimum required skills, qualifications and experience (Chitimira et al., 2022). Employing such people would lead to incurrence of UIFWE as they will be unable to fulfil their duties.

User attitudes: Attitudes of municipal administrators also plays a part in implementation of policies (Lazarova et al., 2022). This is likely to be prevalent with administrators who double up as politicians. In such a case, they believe that their political hat will protect them from any consequences for non-performance.

The section that follows discusses the procedures followed in carrying out the study.

3 Methods

The study followed a descriptive quantitative approach where data from the reports by the Auditor General's office were extracted and used to estimate the influence of mSCOA on financial management performance of municipalities. No sampling was done as data from all municipalities in South Africa were considered. To estimate the change resulting from implementation of mSCOA, we considered 2 years prior to implementation of mSCOA (2015–16 and 2016–17); the year of implementation (2017–18) and 4 years after implementation (2018–19; 2019–20; 2020–21 and 2021–22). The selection of these years allowed us to observe the trend during the selected periods. We argue that, considering the objectives of mSCOA, the impact of mSCOA should show in the trends of UIFWE before and after its implementation. We do confess that there could be several once-off factors that could influence UIFWE, which were not present before mSCOA implementation, such as COVID-19 pandemic, but the general trend of UIFWE should be downward or at least constant if mSCOA has an influence on financial management performance of municipalities.

3.1 Measurement of Municipal Financial Management Performance

Performance is a broad concept which can be measured in terms of financial management (Mishi et al., 2022). Financial management performance involves analysis of how municipalities effectively utilise financial resources to attain their predetermined objectives (Sibanda et al., 2020). To estimate financial performance of municipalities, UIFWE was used as a proxy. This proxy was selected because the Auditor General of South Africa (AGSA, 2022) links incurrence of UIFWE to financial management performance of municipalities. Municipalities that incur high levels of UIFWE are considered to have poor financial management performance whilst those with lower UIFWE have higher financial management performance. This claim was supported by Mishi et al. (2022) who found unauthorised, fruitless and wasteful expenditures to negatively impact on efficiency, thus performance of municipalities.

3.2 Data Analysis

To visualise the trends of UIFWE during the selected period, trends were created from the data obtained, using Microsoft Excel programme. The data was analysed in aggregate form (South Africa as a whole and total UIFWE) as well in disaggregated form (per province and per category of UIFWE). Such an approach would assist with having a big picture view as well provincial and cost category view, which would reduce the effects of averaging out the effects.

4 Results

The analysis is premised on the assumption that, all things being equal, the implementation of a program should result in change of performance if it is to be considered effective. As such, we assume that the implementation of mSCOA should improve the financial reporting and financial management of municipalities, by reducing UIFWE which in turn, would improve the financial management performance. In so doing, we understand the complex nature of financial management, the shortage of skills in municipalities, insufficient financial resources and the volatile environments that municipalities operate in.

To aid in estimating the impact of mSCOA on UIFWE, a combined bar and line graph was used to present the trend of the expenditures. Figure 1 presents the trend of the expenses.

Whilst Fig. 1 does not clearly show a smooth trend, there is a general increase in UIFWE throughout the period under study. Considering the unreadiness of several municipalities to implement mSCOA (AGSA, 2017; Brown, 2020), a huge increase in UIFWE was expected in 2017–18 financial year but on the contrary, the expenses dropped compared to the previous financial year. It is difficult to assume that the implementation of mSCOA, of which about 84% of the municipalities (AGSA, 2017) were not ready, was responsible for such a drop in expenditure. The

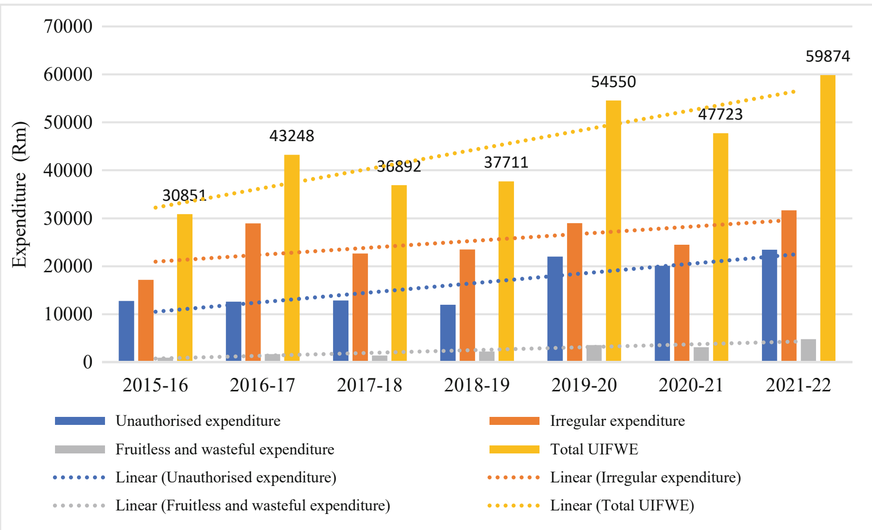

Fig. 1 UIFWE: 2015 to 2022 financial year. Source: Auditor General reports, 2015/16 to 2021/22

Table 2 Changes in UIFWE after implementation of mSCOA per province. Source: Auditor General reports, 2015/16 to 2021/22

	2017-18	2018-19	2019-20	2020-21	2021-22
EC	100%	-54%	41%	3%	122%
FS	100%	48%	74%	-37%	16%
GP	100%	-28%	160%	-13%	33%
KZN	100%	83%	9%	-30%	15%
LP	100%	-16%	42%	16%	-19%
MP	100%	3%	52%	-15%	51%
NC	100%	-10%	69%	5%	-1%
NW	100%	13%	23%	0%	-18%
WC	100%	243%	-49%	-2%	16%

implementation of mSCOA, could however, have unsettled administrators limiting the use of their budgets. Whilst there was an overall decrease in total expenses in 2017–18 financial year, unauthorised expenditure increased.

There is a general increase in UIFWE since implementation of mSCOA on 1 July 2017 with a very slight reduction in 2020–21 financial year. The total UIFWE increased from a total of R36,892 billion in 2017–18 to R59,874 billion in 2021–22 financial year. Whilst one can argue for non-factoring of effects of inflation, the increase of over 60% in a four-year period is very high. Between 2018 and 2022 financial years, unauthorised expenditure increased by 82% (R10,576 billion); irregular expenditure increased by 40% (R9 billion) whilst fruitless and wasteful expenditure rose by more than 246% (R3,406 billion). These significant changes are a sign of a situation that is deteriorating.

It is possible that a holistic view may, at times, overshadow some positive developments. To further understand the meaning of the results and eliminate effects of averaging out figures for all provinces, the aggregated changes per province, since the implementation of mSCOA, are presented in Table 2.

Using 2017–18 as a base year, we calculated the changes in UIFWE based on aggregate figures. Table 2 shows that there were a few positives along the way but the overall picture being portrayed is of a negative nature. This picture does not show any sustained increase or decrease in UIFWE since implementation of mSCOA. Whilst there were some positives from 2017–18 financial year to 2018–19 financial year, only Western Cape enjoyed a reduction in UIFWE in 2019–20 financial year.

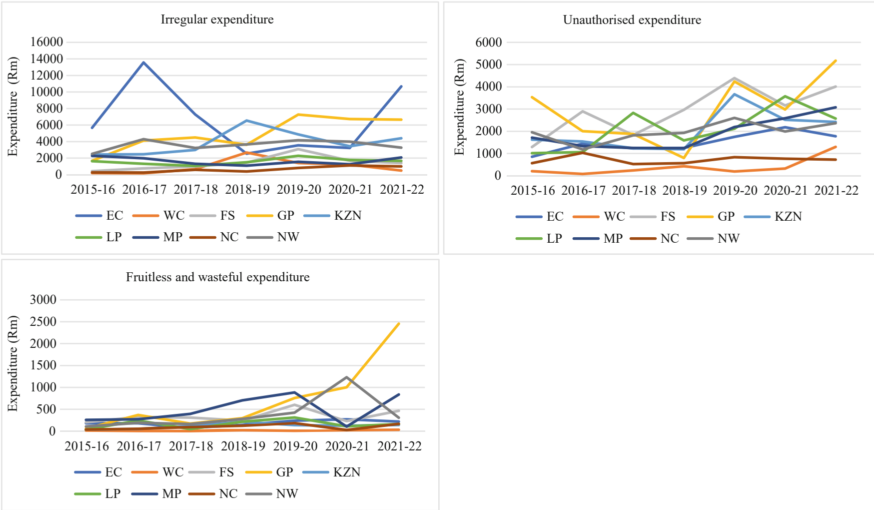

Fig. 2 UIFWE per province. Source: Auditor General reports, 2015/16 to 2021/22

Whilst this can be seen as a positive, generally, the Western Cape Province has obtained clean audits and implementation of mSCOA could not be the reason for this improvement.

The 2020–21 financial year had the most positive outlook with a reduction in UIFWE in five of the nine provinces whilst there was no change in the Northwest Province. Only Eastern Cape, Limpopo and Northern Cape had an increase in UIFWE. After showing some positives in 2020–21 financial year, the expenditures increased in six of the nine provinces in the 2021–22 financial year. Looking at these aggregate provincial expenditures, there is no single province that enjoyed a reduction in UIFWE over the five-year period presented in the table. The closest to good performance was the Western Cape Province, which enjoyed a two-year reduction in UIFWE, in 2019–20 and 2020–21.

In further understanding the trends in UIFWE incurred by municipalities, we disintegrated the expenditures according to the category, per province. Figure 2 shows the results of this process. As portrayed in Fig. 2, irregular expenditure is a component of UIFWE that contributes the highest proportion. These costs fluctuated during the period under study, in all provinces except for Northern Cape, which seemed constant. Provinces with highest fluctuations included Eastern Cape, Gauteng and Free State, showing a greater inability to manage these expenses. The trends in irregular expenditures, in all provinces, do not provide any evidence of a reduction in irregular expenditures, showing no evidence of improvement in municipality financial management performance.

Unauthorised expenditures, which contributed the second highest proportion of UIFWE, also showed lots of fluctuations in all provinces. Whilst no clear trend is visible in Fig. 2, the unauthorised expenditures in the 2021–22 are much higher than the 2015–16 expenditures which were incurred before implementation of mSCOA.

Whilst also fluctuating, fruitless and wasteful expenditure, unlike irregular and unauthorised expenditures, portrays a visible incremental trend in the period under study. This trend is mostly contributed to by Mpumalanga, Northwest and Gauteng provinces which had the highest movements in these costs. All components of UIFWE in all provinces, have shown no evidence of a gradual reduction, implying no improvement in management of these costs in municipalities.

The indication of no significant change or reduction in UIFWE is worrying, considering the resources that are put in efforts to improve financial management performance, reduce UIFWE and eventually, improve service delivery. Substantial resources were utilised in developing mSCOA, piloting it and training administrators, as such, it would be worrying if it becomes a fruitless and wasteful expenditure.

The data presented in the tables and figures before shows some trends in the UIFWE, expressed per province and aggregately. From the country view as well as provincial view, there is no evidence that financial management performance has improved since implementation of mSCOA, even 4 years after its implementation. On the contrary, data shows that the situation is getting worse if the expenditures incurred are a true reflection of performance. Whilst it cannot be claimed that mSCOA is not generating intended results, there is no evidence that it is.

Using the Social Realist lens, the lack of evidence for positive effect of mSCOA can be attributed to a number of social structures which affect agency of MAs. The result is not necessarily a sign that the mSCOA intervention was poorly designed but points to inadequate preconditions to implementation as well as constraints in its implementation. This claim is justified by the confidence that some researchers have in the South African municipal policies whist they decry their poor implementation (Munzhedzi, 2016; Sutcliffe & Bannister, 2020). By focussing on social structures conditioning, SRT provides a better explanatory view to poor performance of municipalities. Social structures, as well as past experiences of MAs, act as preconditions necessary for success of interventions. Most of these factors were identified in previous research.

Institutional structures are a necessary condition for success of interventions such as mSCOA. One of these structures is digital transformation (Lazarova et al., 2022) which is necessary for adoption and use of mSCOA. Whilst it is a fundamental precondition to success of mSCOA, the digital transformation of administrative processes in municipalities is a slow and complex process that requires special attention (Lazarova et al., 2022). A study by HSRC (2022) found that ICT is one of the key skills that most municipalities lack. Most municipalities particularly in developing countries experience challenges in adopting and implementing e-municipality (Nel-Sanders & Malomane, 2022). Even municipalities in developing countries have huge disparities amongst them in terms of the digital divide, technical, economic and social issues. The digital divide within South African municipalities is not surprising, considering the huge social disparities between urban and rural areas as well as between provinces. Whilst provinces such as Western Cape and Gauteng do have sufficient resources due to their developed economies, provinces such as the Eastern Cape and Mpumalanga are lagging, leading to difficulties in attracting qualified and skilled administrators to effectively run the municipality businesses. These differences make implementation of a program such as mSCOA, slow, as claimed by Lazarova et al. (2022). It is therefore possible that results of the project are yet to be felt due to this slow transformation. Replicating a similar study in a year or two would improve the reliability of the findings.

Intergovernmental relations is another structure that constrain success of mSCOA. In his study, Brown (2020) argued that municipalities were not ready for implementation of mSCOA in 2017 and as such, it was implemented at the behest of national government (National Treasury), without considering the status and needs of municipalities. The claim also resonates with De Visser (2018) who argue an incoherence of policies between provincial and national government. Brown (2020) suggested that the National Treasury should have implemented mSCOA on a phased approach as municipalities differed in terms of categorisation, their financial and human resources capacity. At time of implementing in 2017, system vendors were still in the process of developing mSCOA-enabled systems. Similar arguments were highlighted in the Auditor General's report (AGSA, 2017) where it was reported that most municipalities were making very slow progress. Some of the factors claimed to slow down the readiness included, among others, capacity and skills constraints; financial resources; waiting for outcomes of pilot municipalities; data cleansing, migration and mapping and keeping up with different versions of mSCOA released.

Sutcliffe and Bannister (2020) identified a number of implementation weaknesses on implementation of mSCOA. These included the incorrect use of the mSCOA and municipal accounting practices; budgeting, transacting and reporting in excel spreadsheets and then importing to core financial systems instead of preparing directly in the core systems; municipalities not locking their adopted budgets or financial systems at end of month. The publication claims that use of excel spreadsheets gave rise to manipulation of data, fraud and corruption as controls built in core systems were not triggered, enabling transactions not allowable to go through (Sutcliffe & Bannister, 2020).

Other structures that could have an effect on success of mSCOA include political interference, weak control environments, insufficient human capacity, corruption and attitudes of municipal administrators, which were discussed in the literature review section. Regardless of the exact preconditions behind slow progress of mSCOA, it is critical that these underlying factors are identified and attended to, to avoid mSCOA being a fruitless and wasteful exercise.

5 Limitations

There are a number of limitations in this study. Firstly, there are no inferential statistics to show the presence and extent of relationship between mSCOA and financial management performance, in this case UIFWE. Whilst there seems to be an increase in UIFWE, we could not prove its relationship with mSCOA, making it impossible to generalise the results. The increase in UIFWE could have been a result of extraordinary events such as COVID-19 pandemic, yet this study could not establish the impact. Secondly, there is not enough disintegration of the data beyond the provinces. Breaking down the data into municipalities and performance activities could have provided better quality results needed practice purposes. Lastly, complex projects such mSCOA may require more time to have an impact and as such, this study could have been carried out too early. This is because mSCOA is a relatively new intervention and there has not been a long-enough time to measure the effects. It is necessary to repeat a similar study in the future. Despite these limitations, there is need for National Treasury, who is the custodian of MPFA, to assess the enablers and constraints for success of the municipal standard chart of accounts.

6 Conclusions

This study intended to establish if UIFWE dropped and financial management performance improved as a result of the implementation of mSCOA in 2017. Trend analysis performed did not indicate any reduction in UIFWE, instead, the expenditures increased. This finding is an indication that, factors beyond mSCOA, are responsible for non-performance of mSCOA. This resonates with authors such as Munzhedzi (2016); and Sutcliffe and Bannister (2020), who argue that poor performance is not a consequence of lack of good policies. The SRT informs us that implementation of interventions and policies without consideration for structures and culture would not result in meaningful change. Instead of spending limited resources on development of policies and interventions, the government and its agencies, are advised to direct more energies in identifying, assessing and realigning structures that would enable or constrain performance of policies and interventions. Concerted efforts are required from every member of the governmental ecosystem if benefits from well-designed programs such as mSCOA are to result in improved financial management performance and service delivery. National Treasury should revisit the conditions necessary for success of mSCOA and address them to improve its performance.

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Should the South African Tax Relief Measures Offered in Respect of Bursaries or Scholarships for Tertiary Education Be Aligned with Tax Relief Measures Offered in the United Kingdom and the United States of America?

Matthew Andreas Ritzlmayr and Henriette Lynette Erasmus

Abstract Education bolsters employment opportunities, facilitates economic growth, diminishes poverty and increases collective prosperity. The primary challenge encountered by students in attaining a tertiary education qualification in the Republic is to secure funding for their studies. To counter tertiary funding challenges, bursaries and scholarships are offered by companies and institutions to students. This paper assessed whether the South African tax relief measures offered in respect of qualifying bursaries or scholarships for tertiary education, as delineated in sections 10(1)(*q*) and (*qA*) of the Income Tax Act, are aligned with the tax relief measures offered in the United Kingdom and the United States. A comparative analysis of the tax relief measures offered in respect of bursaries and scholarships in the Republic, the United Kingdom and the United States was performed. The paper demonstrated that tax relief measures offered in the Republic in respect of bursaries and scholarships for tertiary education were in alignment with the tax relief measures offered in the United Kingdom and the United States. The extent of the tax relief offered in the Republic was, however, noted to be more extensive as it was not merely limited to full-time and degree-seeking students; a necessity to increase tertiary education in a developing country, such as the Republic.

Keywords Bursary · Scholarship · Tax Relief · Section 10(1)(*q*) · Section 10(1)(*qA*) · Tertiary education · Tuition

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1 Introduction

1.1 Background

President Nelson Mandela, Noble Peace Prize winner and advocate for education in the Republic of South Africa (The Republic), deemed education the most powerful weapon to effect change in the world (Tayfield, 2018). Education bolsters employment opportunities, facilitates economic growth, diminishes poverty, and increases collective prosperity (World Bank, 2021).

Tertiary education is defined as any additional studies undertaken by students at institutions, including universities, colleges, and trade schools (World Bank, 2021). Tertiary education enhances students' employment opportunities and provides the South African workforce with skilled individuals (Regent Business School, 2016). The employment rate of persons aged 25 to 64 years, with a tertiary education qualification equated to 85% (OECD, 2019b). An increase of 30% in the employment rate compared to persons with secondary education qualifications (OECD, 2019b). Merely 7% of the adult population in the Republic has a tertiary education (OECD, 2019b).

The primary challenge encountered by students in attaining a tertiary qualification in the Republic was to secure funding for their studies. Tertiary education in the Republic is costly (Businesstech, 2022). Tuition fees increase year-on-year (Businesstech, 2022). Tuition fees increased by 4.7% and accommodation fees by 6.7% during the 2021 academic year. An increase in tuition fees of 4.3% and accommodation fees of 6.3% was noted during the 2022 academic year (Businesstech, 2022). This presents challenges to less fortunate households to obtain tertiary education (Bitzer & De Jager, 2018). In the Republic, 51% of persons aged 18 to 24 years did not possess the necessary funds to obtain a tertiary education *(*Statistics South Africa*,* 2019*)*. The *'#Feesmustfall'* movement highlighted the plight of students (Mlaba, 2021). A workable solution is yet to be found (Mlaba, 2021).

Bursaries and scholarships are offered by companies and institutions to provide students with financial aid to further their studies (Tristan, 2022). A 'bursary or scholarship' is defined, in broad, as a sponsorship granted by a person to aid a student to further his or her studies and obtain a qualification to increase his or her likelihood of employment (Bursaries South Africa, 2022).

Sections 10(1)(*q*) and (*qA*) of the Income Tax Act 58 of (1962) (ITA) provides a tax exemption in respect of qualifying *bona fide* bursaries or scholarships granted to an individual to enable such individual to study at a recognised institution (SARS, 2012). Due to the importance of bursaries and scholarships as funding mechanisms for tuition, it raises the question of whether the tax relief offered in the Republic in respect of bursaries and scholarships to aid individuals in attaining a tertiary education is aligned with tax relief measures offered in the United Kingdom and the United States of America (United States).

1.2 Research Question

Should the tax relief measures offered in the Republic in respect of bursaries and scholarships for tertiary education be aligned with tax relief measures offered in the United Kingdom and the United States?

To address the research question, the following sub-questions were addressed:

> First, what constitutes tertiary education? What is the economic significance of attaining a tertiary qualification? In what manner do bursaries and scholarships enable students to study at tertiary institutions?
>
> Second, which tax relief measures were offered in the Republic in respect of bursaries and scholarships as at 28 February 2022, as delineated in sections 10(1)(*q*) and 10(1)(*qA*) of the Income Tax Act?
>
> Third, which tax relief measures were offered in the United Kingdom in respect of bursaries and scholarships as at 28 February 2022, as delineated in section 776 of the Income Tax (Trading and Other Income) Act 2005, read together with, sections 221-225 of the Income Tax (Earnings and Pensions) Act 2003?
>
> Fourth, which tax relief measures were offered in the United States in respect of bursaries and scholarships as at 28 February 2022, as delineated in section 117(d) of the Internal Revenue Code of 1986, read together with section 127 and 132 of the Internal Revenue Code of 1986 (IRC)?
>
> Finally, are the tax relief measures offered in the Republic in respect of bursaries and scholarships in alignment with tax relief measures in the United Kingdom and the United States? Are any amendments required in this respect to broaden the extent of such tax relief provided in the Republic?

1.3 Importance

Tertiary education is costly. It causes difficulty for less fortunate households in obtaining tertiary education (Bitzer & De Jager, 2018). Bursaries and scholarships awarded to students alleviate the financial burden associated with tertiary tuition fees (Ceves, 2021). Considering the importance of bursaries as a tertiary funding mechanism in the Republic, this paper may be beneficial to all tertiary education stakeholders by evaluating whether the South African tax relief measures are in alignment with international counterparts.

The National Student Financial Aid Scheme (NSFAS), a bursary scheme in the Republic, receives a high volume of bursary applications annually (Gallow, 2022). NSFAS provides financial support to disadvantaged students wishing to pursue studies at public universities or technical and vocational education and training (TVET) colleges (NSFAS, 2022). NSFAS received 906,429 applications for bursaries in 2022, demonstrating the substantial number of individuals requiring financial aid to study (Dyomfana, 2022). NSFAS provided funding of R42 billion in 2022 (Samuels, 2022).

1.4 Research Method

A cross-jurisdiction comparative analysis was performed. The United Kingdom and the United States were selected for comparable analysis purposes, as both jurisdictions had similarly high tertiary tuition fees (OECD, 2019a) and student support systems that made bursaries and scholarships available to students (OECD, 2019a). These 2 jurisdictions were also ranked amongst the leaders in tertiary education in terms of the QS World University Ranking (QS World University Ranking, 2021). The 5 top universities for 2022, namely, Massachusetts Institute of Technology (MIT), Oxford, Stanford, Cambridge, and Harvard are located in these 2 jurisdictions.

Analysis of the tax relief measures granted in developed countries may be of value to strengthen the tax relief measures in developing countries, such as the Republic. When interpreting the findings, this difference will be taken into consideration.

The research method applied was a qualitative approach. A literature review of relevant legislation, journal articles, discussion papers and other published material was performed.

1.5 Scope and Delimitations

The scope of this paper was limited to the income tax relief measures in respect of bursaries and scholarships granted in the Republic, United Kingdom, and United States to attain a tertiary education.

2 Tax Relief Offered in Respect of Bursaries and Scholarships in the Republic

2.1 Definition of 'bursaries or scholarships'

The term '*bona fide* bursary or scholarship' is not defined in the ITA. South African Revenue Service (SARS) Interpretation Note 66 defines a '*bona fide* bursary or scholarship' as any financial aid or aid of a similar nature granted to an individual to assist an individual in studying at a recognised institution (SARS, 2012). The financial aid should be granted to an individual to pursue studies and to attain a necessary level of knowledge, abilities, or skills (SARS, 2012). Any financial aid granted in respect of studying expenses that are to be reimbursed following the completion of studies does not constitute a '*bona fide* bursary or scholarship' (SARS, 2012). Financial aid to conduct research for the benefit or on behalf of another person does not constitute a '*bona fide* bursary or scholarship', as the primary objective thereof is to benefit the grantor (not the individual) (SARS, 2012).

A '*bona fide* bursary or scholarship' does not merely refer to tuition fees paid. It also refers to the funding of books, accommodation, registration fees, examination fees, equipment required, transportation to and from campus and meals to sustain the individual (SARS, 2012). Qualifying expenses includes tuition and tuition-related expenses.

2.2 Overview of the Tax Relief Offered in Respect of Bursaries and Scholarships

Sections 10(1)(*q*) of the ITA provides tax relief, in the form of an exemption, for a 'qualifying *bona fide* bursary or scholarship' received by an individual to enable such individual to study at a recognised institution (Haupt et al., 2022: 99). Sections 10(1)(*qA*) provides similar relief for a person with a disability (Stiglingh et al., 2022: 105; Haupt et al., 2022: 99). Section 6B of the ITA defines a 'disability' as a mild to serious limitation of an individual's ability to perform daily activities that has lasted or may last more than one year (SARS, 2021b). It may constitute a physical, sensory, communication, intellectual or mental impairment (SARS, 2021b).

2.2.1 Requirements to Be Met for a Bursary or Scholarship to Qualify for Tax Relief (an Exemption) in Terms of Sections 10(1)(*q*) and 10(1)(*qA*)

The requirements to be met for a bursary or scholarship awarded to be exempt from tax in terms of sections 10(1)(*q*) and 10(1)(*qA)* are as follows:

A 'bona fide bursary or scholarship' awarded to enable an individual to study at a recognised institution:

The use of the phrase '*to enable'* refers to affording an individual (non-employee, employee or relative of an employee) the opportunity to study. The *bona fide* bursary or scholarship should, therefore, be granted in pursuit of an individual's studies. The use of the phrase '*to study'* does not merely constitute enrolling for a degree or diploma. It denotes any formal process during which the individual increases his or her level of knowledge, ability, or skill through learning. (SARS, 2012).

The exemptions contained in sections 10(1)(*q*) and 10(1)(*qA*) of the ITA only apply if the individual studies at an institution that is 'recognised' by the South African Revenue Service (SARS, 2012). An institution is 'recognised' by the South African Revenue Service, if the institution is registered in terms of the laws of the Republic, such as the Higher Education Act, 1997 (SARS, 2012).

For bursaries or scholarships awarded to employees or relatives of employees, further requirements need to be met in terms of sections 10(1)(*q*) and 10(1)(*qA*). These requirements are delineated below.

In respect of 'bona fide bursaries or scholarships' awarded to an employee, the employee agrees to reimburse the employer should he or she fail to complete his or her studies, by reason other than injury, ill-health, or death:

The rationale for the reimbursement of the bursary or scholarship, should the employee fail to complete his or her studies, is to ensure that such employee takes his or her bursary or scholarship responsibility seriously (National Treasury, 2006: 11) and to ensure that tax relief is offered to persons who are committed to completing and attaining further education.

In respect of 'bona fide bursaries or scholarships' awarded to a relative of an employee, the employee's remuneration proxy may not exceed R600 000:

'Remuneration proxy' is defined in sect. 1 of the Income Tax Act as the remuneration an employee received in a prior year of assessment or, where the employee was not employed for the full prior year of assessment, the remuneration is annualised to represent the employee's annual remuneration. The exemption that may be claimed by the employee for bursaries or scholarships awarded to a relative of the employee, should the employee's remuneration proxy not exceed R600 000, is determined by the course National Qualification Framework (NQF) level of the relative.

The above requirements are tabulated below:

	Non-Employee	Employee	Relative of Employee
A 'bona fide bursary or scholarship' awarded to enable an individual to study at a recognised institution:	✓	✓	✓
The employee agrees to reimburse the employer should he or she fail to complete his or her studies, by reason other than injury, ill-health, or death:		✓	
In respect of 'bona fide bursaries or scholarships' granted to a relative of an employee, the employee's remuneration proxy may not exceed R600 000:			✓

2.2.2 Tax Relief Offered in Respect of 'qualifying bursaries or scholarships'

'Qualifying bursaries or scholarships' awarded to non-employees or employees that meet the requirements of sections 10(1)(*q*) and 10(1)(*qA*) are fully exempt.

For a 'qualifying bursary or scholarship' awarded to a relative of the employee that meets the requirements of sections 10(1)(*q*) and 10(1)(*qA*), the exemption that may be claimed by the employee, should the employee's remuneration proxy not exceed R600 000, is determined by the course NQF level of the relative. In terms of section 10(1)(*q*), for NQF levels 1 to 4, an amount of R20 000 per annum may be exempt and, for NQF levels 5 to 10, an amount of R60 000 per annum may be exempt (Parker et al., 2021). In terms of section 10(1)(*qA*), the exemption available to a disabled relative is R30 000 per annum for NQF levels 1 to 4 and R90 000 per annum for NQF levels 5 to 10 (Parker et al., 2021).

The exemption of bursaries or scholarships awarded to employees or relatives of employees would not be permitted if it constitutes a salary sacrifice (van Wyk, 2021). A salary sacrifice arrangement entails re-categorising a portion of an employee's remuneration to constitute a bursary (Parker et al., 2021; Arendse, 2020). This type of tax avoidance places a burden on the fiscus (Parker et al., 2021).

3 Tax Relief Offered in Respect of Bursaries and Scholarships in the United Kingdom

3.1 Definition of 'Scholarships'

In terms of section 776(3) of the Income Tax (Trading and Other Income) Act 2005 (IT(TOI)A), the term 'scholarship' refers to any bursary, exhibition, or other similar educational endowment (GOV.UK, 2022b). According to the Oxford Dictionary, the ordinary grammatical meaning of the terms 'scholarship' or 'bursary' denotes any amount of financial aid afforded to a person by an organisation or individual to aid his or her education (Oxford Dictionary, 2022).

Scholarships awarded to employees to fund tuition-related expenses (such as accommodation, subsistence and travel allowances) is limited to an amount of £15,480 for the academic year (GOV.UK, 2022g). In respect of amount exceeding the threshold of £15,480, Her Majesty's Revenue and Customs (HMRC) is not bound by Statement of Practice 4/86 and may scrutinise such payments to evaluate whether such amounts constitute employment-related income that is subject to tax (GOV.UK, 2022f; GOV.UK, 2022g). The exemption provided in section 776 (refer to below) will not apply to the amount earned by employees for work performed during vacation periods (GOV.UK, 2022g). The rationale for a fixed threshold amount is to reduce the administrative burden for the employer and employee (HM Treasury, 2005: 205).

3.2 Overview of the Tax Relief Offered in Respect of Scholarships

The scholarship income exemption is delineated in section 776 of the IT(TOI)A. The requirements to be met for scholarship income to be exempt in terms of section 776, read together with, sections 213 and 215 of the Income Tax (Earnings and Pensions) Act 2003 (IT(EP)A) are as follows:

The individual needs to attend a school, college, university, or any other educational establishment:

A 'college, university or any other education establishment' refers to any college, university, or any other educational establishment open to the general public offering a variety of courses, either academic or practical (GOV.UK, 2022d). The individual's studies need to be undertaken at such an educational establishment, as the section 776 exemption may not be claimed for studies undertaken elsewhere (GOV.UK, 2022d).

An 'educational establishment' is defined as an educational institution with its primary objective being education (GOV.UK, 2022d). Should the establishment's primary objective be that of research (not education), the establishment does not meet the definition of an 'educational establishment' (GOV.UK, 2022d). Should an employer carry on its own in-house school or college, it will not constitute an 'educational establishment' as defined (GOV.UK, 2022g).

The individual to whom the scholarship is awarded should be in full-time education:

The individual should be registered as a full-time student at an educational establishment at a university undergraduate or any comparable level (GOV.UK, 2022c). Individuals enrolled for a doctorate, or any comparable qualification are considered to be full-time students, where the primary objective is to attain training in research techniques and the secondary objective to conduct research (GOV.UK, 2022c).

A course which an employee attends will be deemed full-time if the prescribed registration and attendance period is met (GOV.UK, 2022i). The registration period for an employee is prescribed as 1 full academic year which equates to the employee attending the course for 20 or more weeks in that academic year (GOV.UK, 2022g). If the course exceeds 1 year, the employee needs to attend the education establishment for 20 weeks, on average, per academic year for the duration of his or her studies (GOV.UK, 2022g).

The requirements are tabulated below:

	Non-employee	Employee	Relative of Employee
The individual attends school, college, university, or any other educational establishment:	✓	✓	✓
The individual to whom the scholarship is awarded is in full-time education:	✓	✓	✓

'Qualifying bursaries or scholarships' awarded to non-employees or employees that meet the requirements of section 776, read together with, sections 213 and 215 of the IT(EP)A are exempt in full.

For a scholarship awarded to a relative of an employee that meets the requirements of section 776, read together with, sections 213 and 215 of the IT(EP)A, only the scholarship income for the scholar (relative of the employee) is exempt. The amount constitutes a taxable benefit for the employee in terms in terms of sections

215 of IT(EP)A read together with the benefit code in section 63(1) of the IT(EP)A, unless the scholarship was granted fortuitously to the relative of the employee (GOV.UK, 2022h). Section 213 stipulates that a scholarship is regarded as fortuitous when the following 4 requirements are met:

> First, the individual is in full-time education;
>
> Second, the scholarship must be awarded purely on merit to the relative and not by reason of the employee's employment;
>
> Third, the scholarship needs to be operated under a scheme or trust fund;
>
> Fourth, 25% or less of the payments made by the scheme or trust fund are in respect of employment-linked scholarships. (GOV.UK, 2022h)

The personal allowance threshold for the 2022/2023 tax year was set at £12,570 (GOV.UK,2022a). Should the 'taxable scholarship benefits' be less than the personal allowance threshold, the employee will not be subject to income tax (GOV. UK, 2022a).

4 Tax Relief Offered in Respect of Bursaries and Scholarships in the United States

4.1 Definition of a 'Qualified Scholarship'

Section 117(b)(i) of the Internal Revenue Code of 1986 (IRC) defines a 'qualified scholarship' as any amount received by an individual that constitutes a scholarship to fund 'qualified tuition and related expenses' (Cornell Law School, 2022; I.R.C. § 117). 'Qualified tuition and related expenses' are defined in section 117(b)(2) of the IRC as tuition fees, registration fees to enrol at an education institution, as well as any other fees, books, supplies, and equipment that an individual may require for a course at an education institution (Cornell Law School, 2022; I.R.C. § 117). Non-qualifying tuition-related expenses for purposes of section 117 of the IRC includes accommodation costs, incidental expenses, travel, and any other equipment and supplies that the individual may require in respect of his or her studies (Tufts University, 2021).

Section 117(c)(1) stipulates that if a student is awarded a scholarship, but any condition stipulating that the payment thereof is based on certain required services, teaching or research being rendered by the student, the amount does not qualify for exclusion from gross income in terms of section 117(a) (Cornell Law School, 2022). Such amounts will be included in the gross income of the student and subject to tax (Cornell Law School, 2022).

'Qualified scholarships' further exclude any amounts paid to an individual for any services rendered (employment and non-employment services) or research performed primarily for the benefit of the employer or grantor (Internal Revenue Service, Treasury, 2004:517). The primary objective of this regulation is to include in the individual's gross income any amounts that formed part of a scholarship awarded to the individual, but, in fact, constituted compensation for services rendered (Internal Revenue Service, Treasury, 2004:517). These amounts may not be excluded from gross income and should be subject to tax (Fenton, 2004).

4.2 Overview of the Tax Relief Offered in Respect of Scholarships

Section 117 of the IRC stipulates that an amount obtained by an individual in respect of a 'qualified scholarship' is not to be included in the gross income of an individual (I.R.C. § 117). It, therefore, constitutes a non-taxable benefit. The requirements to be met for a bursary or scholarship awarded to be excluded from gross income in terms of section 117 of IRC are as follows:

The individual awarded the scholarship needs to study at an educational organisation:

An 'educational institution' is defined in Treasury Regulation 1.170A-9(c)(1) as an institution that upholds the primary objective of presenting formal instruction; the primary objective of the organisation should, therefore, be education. This institution should adhere to a formal curriculum and sustain a regular faculty (Legal Information Institute, 2022). The institution should also regularly enrol individuals to study at their premises, where its educational activities are carried out (Legal Information Institute, 2022).

The individual to whom the scholarship was awarded should be studying towards a degree:

Section 117 of the IRC stipulates that no amount is to be included in the gross income of the individual who was awarded a scholarship if it relates to a 'qualified scholarship' to assist an individual to pursue a degree at an educational organisation (I.R.C. § 117). The individual needs to pursue a degree at an undergraduate or postgraduate level at a qualifying educational organisation to qualify for the scholarship exclusion in terms of section 117 of the IRC (Kluwer, 2022).

The requirements are tabulated below:

	Non-Employee	Employee	Relative of Employee
The individual needs to study at an educational organisation:	✓	✓	✓
The individual to whom the scholarship is awarded the scholarship should be studying toward a degree:	✓	✓	✓

For 'qualifying scholarships' awarded to employees who are not seeking to attain a degree, sections 127 and 132(d) of the IRC provide tax relief in the form of a tax-free limit of $5250 and a tax-free 'employment condition' benefit (Fenton, 2004). This is to ensure the inclusivity of all employees in accessing tax benefits.

Section 127 allows an employer to offer a tax-free education benefit to its employees to the value of $5250 annually per employee in respect of all graduate and undergraduate tuition-related expenses (Fenton, 2004). The benefit should be due to the employee's employment (Fenton, 2004). Support offered by employers should be formally documented, open to all employees and not favour highly compensated employees (Fenton, 2004). The employee is not required to study towards the attainment of a degree and the course need not be job-related (Fenton, 2004).

Section 132(d) of the IRC permits a tax-free 'employment condition' benefit to be awarded to an employee by an employer for employment-related expenses (Fenton, 2004). It includes travel and meals, but also includes education expenses incurred directly due to the employee's employment (Fenton, 2004). The education expenses should either maintain or improve an employee's skills to be utilised in his or her employment (Fenton, 2004). No monetary limit is placed on the amount of aid afforded to the employee. The expenses incurred need to be ordinary, necessary, and reasonable (Fenton, 2004).

Sections 127 and 132 of the IRC are tabulated below:

IRC section	Degree-seeking	Institutional requirements	Job relevance	Benefit cap
127	Not required	None	Not required	$5250 per employee
132	Not required	None	Required	None

*Source: (*Burns and Simon*,* 2017*:14)*

'Qualifying scholarships' awarded to individuals (non-employees, employees or relatives of employees) that meet the requirements of section 117 are not to be included in gross income. It constitutes a tax-free benefit.

For 'qualifying scholarships' awarded to employees who are not seeking to attain a degree, sections 127 and 132(d) provide tax relief in the form of a tax-free limit of $5250 and a tax-free 'employment condition' benefit respectively.

5 Comparative Analysis of Tax Relief Measures Offered in the Republic, United Kingdom, and United States in Respect of Bursaries and Scholarships

5.1 Definition of 'qualifying bursaries or scholarships'

'Qualifying bursaries or scholarships' was similarly defined in the 3 jurisdictions, namely, financial aid awarded to enable or assist an individual to study. Compensation payments for services rendered or research performed do not qualify as 'bursaries or scholarships' in either the Republic or the United States, as it constitutes payments for services rendered (not to fund studies) (SARS, 2012; Internal Revenue

Service, Treasury, 2004, p. 517). This emphasises the fact that only financial aid awarded to an individual to enable him or her to study qualifies for tax relief.

'Qualifying expenses' funded by bursaries or scholarships are defined similarly in the 3 jurisdictions, namely, tuition and tuition-related expenses. Tuition-related expenses funded by bursaries are limited in the United States and the United Kingdom to prevent tax abuse by overstating tuition-related expenses. Tuition-related expenses incurred by employees in the United Kingdom are limited to £15,480 per academic year (GOV.UK, 2022g). Accommodation and travel costs, in turn, are excluded from the definition of tuition-related expenses in the United States (Tufts University, 2021). Tuition-related expenses are not limited in the Republic. Although tuition-related expenses are not limited in the Republic, the risk of abuse is mitigated, as tax relief available in respect of bursaries awarded to relatives of employees is limited. In terms of section 10(1)(*q*), for NQF levels 1 to 4, an amount of R20 000 per annum may be exempt and, for NQF levels 5 to 10, the amount of R60 000 per annum may be exempt. In terms of section 10(1)(*qA*), for NQF levels 1 to 4, an amount of R30 000 per annum may be exempt and, for NQF levels 5 to 10, an amount of R90 000. These limitations are further set at levels equivalent to the cost of tuition enabling such persons to study without the relief being subject to abuse (overstating of such expenses). These limitations do not appear to limit the availability of tax relief offered to employees in the Republic.

5.2 Tax Relief Measures in Respect of Bursaries or Scholarships

All 3 jurisdictions require that the 'qualifying bursaries or scholarships' be awarded to enable an individual to study at recognised 'educational institutions'.

Jurisdiction-specific requirements that also need to be met to qualify for tax relief were noted. These jurisdiction-specific requirements prescribe the mode of study, type of qualification or the reimbursement of certain 'qualifying bursaries and scholarships'. These requirements are analysed below.

In the Republic, a 'qualifying bursary or scholarship' awarded to an employee may only qualify for tax relief where such an employee agrees to reimburse his or her employer should he or she fail to complete his or her studies, due to reasons other than injury, ill-health, or death (SARS, 2012). The rationale for the reimbursement is to ensure that such employee takes his or her bursary or scholarship responsibilities seriously (National Treasury, 2006, p. 11). A similar requirement does not appear to be present in either the United Kingdom or the United States. This requirement ensures that funds (a scare resource) are awarded to employees committed to completing their studies and attaining a tertiary qualification. This requirement does not appear to limit the availability of tax relief offered to employees in the Republic.

For a scholarship awarded in the United Kingdom, the individual needs to part take in full-time education to qualify for tax relief (section 776(1) of IT(TOI)A). Sections 10(1)(*q*) and 10(1)(*qA*) does not require full-time study which affords relief to both full-time and part-time students in the Republic. Tax relief is, therefore, available to a greater number of individuals, when compared to the United Kingdom.

In the United States, only 'qualifying scholarships' awarded to individuals enrolled to attain degree qualifications qualify for relief (section 117 of the IRC). For employees not studying towards a degree, other tax relief measures are available in terms of sections 127 (tax-free limit of $5250) and 132(d) (tax-free 'employment condition' benefit). Tax relief is available to all degree and non-degree students in the Republic, as 10(1)(*q*) and 10(1)(*qA*) does not prescribe the type of qualification. Tax relief is, therefore, available to a greater number of individuals, when compared to the United States.

Tax relief offered in the 3 jurisdictions in respect of 'qualifying bursaries or scholarships' constitutes either a non-taxable benefit or an exemption of the amount received. This is further analysed below.

In the United States, a 'qualifying scholarships' awarded to an individual enrolled to attain a degree qualify for tax relief in the form of a non-taxable benefit (section 117 of the IRC). Such amounts are not included in the gross income of the individuals (section 117 of the IRC). For an employee not studying towards a degree qualification, tax relief is available in the United States in terms of sections 127 and 132(d). Section 127 enables an employer to offer a tax-free education benefit to its employees to the value of $5250 annually per employee (Fenton, 2004). Section 132 (d) of the IRC awards a tax-free 'employment condition' benefit to an employee for employment-related studies and expenses (Fenton, 2004). Tax relief is available to all degree and non-degree students in the Republic, whereas the United States only offers such relief to employees.

Both the Republic and the United Kingdom exempt 'qualifying bursaries or scholarships' awarded to non-employees or employees if the requirements of sections 10(1)(*q*) and (*qA*) of the ITA and section 776 of the IT(TOI)A are met respectively. The tax relief offered to an employee in respect of a bursary or scholarship awarded to a relative of such employee may, however, be subject to a limitation in the Republic.

In the Republic, where a 'qualifying bursary or scholarship' is awarded to a relative of an employee, to qualify for the exemption, the remuneration proxy of the employee (for the prior year of assessment) may not exceed R600 000 (section 10(1) (*q*) and 10(1)(*qA*) of the ITA). For qualifications at NQF levels 1 to 4, an amount of R20 000 per annum may be exempt from tax and, for qualifications at NQF levels 5 to 10, an amount of R60 000 per annum may be exempt from tax (Parker et al., 2021; section 10(1)(*q*)). The exemption available to a disabled relative is R30 000 per annum for NQF levels 1 to 4 and R90 000 per annum for NQF levels 5 to 10 in terms of section 10(1)(*qA*) (Parker et al., 2021).

For a scholarship awarded to a relative of an employee in the United Kingdom, the scholarship income received by the scholar (the relative of the employee) is exempt from tax. The employee has a taxable benefit unless the scholarship was awarded fortuitously to his or her relative (sections 213 and 215 of the IT(TOI)A)). For bursaries or scholarships awarded to relatives of employees, no tax relief limitations exist in the United Kingdom (where awarded fortuitously to a relative) and the United States. The limits in the Republic are, however, set at levels similar to the cost of tuition enabling relatives of employees to study, where the employee's remuneration proxy does not exceed R600 000. Where the employee's remuneration proxy exceeds R600 000, no exemption is granted, as granting a bursary or scholarship to the relative of such employee may motivate possible tax evasion, and not merely entail assisting a relative to fund his or her studies. As the limitations are set at levels similar to costs of tuition, effectively the same level of tax relief is offered to employees in the Republic when compared to the United Kingdom (where awarded fortuitously to a relative of an employee) and the United States.

6 Recommendations and Conclusion

The attainment of tertiary qualifications increases the employability of individuals, whilst providing the workforce in the Republic with skilled individuals (Regent Business School, 2016). Bursaries afforded to individuals provide such individuals with opportunities to further their tertiary studies by alleviating the financial burden associated with tuition fees (Ceves, 2021). The importance of funding tuition in the Republic was evidenced by the substantial number of funding applications received by the NSFAS in 2022 (Dyomfana, 2022).

This paper assessed whether the tax relief measures offered in respect of bursaries or scholarships for tertiary education in the Republic were in alignment with tax relief measures available in the United Kingdom and the United States and to recommend improvements, where applicable, to broaden the extent of tax relief provided.

The findings are delineated below:

First, 'qualifying bursaries or scholarships' were similarly defined in the 3 jurisdictions, namely, financial aid awarded to an individual to assist him or her in pursuing his or her studies.

Second, 'qualifying expenses' funded by bursaries or scholarships are defined similarly in the 3 jurisdictions, as tuition and tuition-related expenses.

Third, tuition-related expenses funded by bursaries are limited in the United States and the United Kingdom to prevent tax abuse by overstating tuition-related expenses. Tuition-related expenses incurred by employees in the United Kingdom are limited to £15,480 per academic year. Accommodation and travel costs, in turn, are excluded from the definition of tuition-related expenses in the United States. Tuition-related expenses are not limited in the Republic. Although tuition-related expenses are not limited in the Republic, the risk of abuse is mitigated, as tax relief available in respect of bursaries awarded to relatives of employees is limited. In terms of section 10(1)(*q*), for NQF levels 1 to 4, an amount of R20 000 per annum may be exempt and, for NQF levels 5 to 10, the amount of R60 000 per annum may be exempt. In terms of section 10(1)(*qA*), for NQF levels 1 to 4, an amount of R30 000 per annum may be exempt and, for NQF levels 5 to 10, an amount of R90 000. These limitations are further set at levels equivalent to the cost of tuition enabling such persons to study without the relief being subject to abuse (overstating of such expenses).

Fourth, in the Republic, an employee needs to agree to reimburse his or her employer, should the employee fail their studies by reason other than injury, ill-health, or death. This requirement is not present in the United Kingdom and the United States. This requirement does not limit the extent of relief offered in the Republic. It merely ensures that the funding (a scare resource) is allocated to persons committed to the completion of their tertiary studies.

Fifth, tax relief is available to all degree and non-degree students in the Republic. In the United States, an individual needs to study towards attaining a degree to qualify for tax relief in respect of a bursary or scholarship awarded to the individual. Other forms of tax relief are, however, available in the United States where an employee pursues a qualification other than a degree. A greater number of individuals is, therefore, eligible for tax relief in the Republic.

Lastly, qualifying bursaries or scholarships are not limited to merely full-time students in the Republic, as is the case in the United Kingdom. The United Kingdom prescribes full-time attendance for scholarships awarded to employees to qualify for tax relief. The requirements of sections 10(1)(*q*) and10(1)(*qA*) are less stringent. This increases the number of individuals eligible for tax relief in the Republic. This is a necessity in a developing country, such as the Republic.

From the above, it is evident that the tax relief measures in the Republic in respect of bursaries and scholarships awarded to individuals to pursue tertiary education are in alignment with the tax relief measures offered in the United Kingdom and the United States. The extent of the tax relief offered in the Republic for *bona fide* bursaries or scholarships awarded to individuals is, however, more extensive as it was not merely limited to full-time and degree-seeking students when compared to the United Kingdom and the United States; a necessity to increase the overall level of tertiary education in a developing country, such as the Republic.

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Analysis of Local Government Financial Performance: Evidence from South African Metropolitan Municipalities

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Abstract This paper evaluates and analyses the financial performance of South African metropolitan municipalities. The municipality's statement of financial position and statement of financial performance are used in the analysis. A case study research design was followed to evaluate municipalities' financial performance using four criteria: cash solvency, budget solvency, long-term solvency, and service-level solvency. A quantitative research approach was adopted to evaluate the financial performance of the 2011 vs. 2016 local government administration. Eleven variables (ratios) were used to evaluate the municipalities' financial statements from the four criteria. Emanating from the findings, the paper found that the financial performance of municipalities under the 2011 and 2016 administrations has been consistent. Only four of the eleven variables changed over time, resulting in long-term and service-level solvency. The paper found that municipalities' performance has also been consistent in each of the four criteria, where when one Municipality performs best, they will be consistent in all variables in the specific category. For example, Buffalo City has the highest average ratios in the cash solvency analysis. The City of Tshwane was also consistent as a least-performing municipality as it had the lowest average ratios over the three variables used under cash solvency.

Keywords Metropolitan municipalities · Financial performance · Analysis methods; South Africa

1 Introduction

Despite many interventions from provincial or national domains, South African municipalities have struggled to manage their finances (Ntonzima, 2011). Financial management and reporting are critical when evaluating the success or failure of the

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local government in South Africa (Mothupi et al., 2022). Financial reporting is essential in the public sector and enables stakeholders to measure those responsible for the organisation's financial management. Financial reporting analysis enables stakeholders to keep the municipal management accountable (Mbona & Yusheng, 2019; Mothupi et al., 2022*)*. Using financial data to analyse the financial performance of municipalities might result in accountability and public trust (Carmeli, 2002; Rasid et al., 2019). Financial analysis also enables managers with public resources to use them rationally within their discretion, authorisation limits, and accountability (Özkul & Alkan, 2017; Mbona & Yusheng, 2019). When there is poor financial management in municipalities, there might be negative consequences like poor service or no delivery (Khunoethe et al., 2021). Therefore, proper financial management should be well structured for the stakeholders to keep municipal managers accountable. Özkul and Alkan (2017) posit that a well-structured information system for financial management will provide accurate, reliable, timely and sufficient information to managers during the decision-making process. They further argue that accounting officers will fulfil accountability responsibilities when financial management has these qualities including accuracy, timely, sufficient, reliable, and prudent (Özkul & Alkan, 2017; Azar et al., 2019; Mothupi et al., 2022). Financial management systems are critical to transparency, accountability, and efficient and effective service delivery in every Municipality worldwide (Rasid et al., 2019; Mothupi et al., 2022).

The primary goal of financial reporting is to make economic choices and offer essential information to various users about a municipality's financial state and financial performance to make evaluations that will aid in the Municipality's management (Özkul & Alkan, 2017; Mothupi et al., 2022). The quality of financial statements produced by the municipalities will determine the success of measuring their financial performance (Azar et al., 2019). Thus, when municipalities present poor financial statements, they cannot be relied upon as they might not have the earlier qualities. However, there have been cases where South African municipalities failed to prepare financial statements, although their finance business units have employees appointed in those positions (AGSA, 2021). The financial statements are important as they measure the financial performance of municipalities, which affects many stakeholders who might be affected by the Municipality's performance (Azar et al., 2019; Khunoethe et al., 2021). The familiar stakeholders for municipalities are community members (voters and taxpayers), consumers, customers, council, employees, buyers, government institutions, competitors, lenders, sponsors, banks, and these may also be users of financial statements (Özkul & Alkan, 2017).

There is little literature on the financial performance measures of South African municipalities. Swanevelder (2005) conducted a study evaluating South African municipalities' financial statements in the late 1980s. Swanevelder's (2005) study aimed to indicate to the municipal councillors, CFOs, and other consumers of financial statements that municipalities can use various performance measures to evaluate the financial performance of a municipality. The limitation of Swanevelder's (2005) study is that it only provided methods that municipalities may use to evaluate their financial performance, and no empirical evidence of the actual performance of South African municipalities is published in the study. A further study was conducted by Scott (2008) to assess the effect of GAMAP/GRAP implementation by comparing the financial statements of a metropolitan municipality in South Africa prepared based on IMFO standard and GAMAP/GRAP. The study focuses on the effect of accounting practice.

Another study by Davids (2017) evaluated and analysed the financial performance of the Department of Health. However, this study was limited to this provincial department and did not consider any metropolitan municipalities. Thus, the study looks at municipalities' overall financial performance and calculates the actual financial performance of metropolitan municipalities. Unlike previous studies that provided formulas that may be used to evaluate the performance of municipalities, this study looks at the actual financial performance. It is not limited to one province but covers all metropolitan municipalities in the different provinces. Buffalo City, City of Ekurhuleni, City of Cape Town, City of Johannesburg, City of Tshwane Mangaung Municipality and Nelson Mandela Bay in no order.

In South Africa, local government administration gets changed every 5 years, and the study aims to review whether the previous administration prior to the current one appointed in 2021 had significant performance. Thus, the study focused on financial performance for the 2011 and 2016 administrations to evaluate any significant changes in municipal performance considering different administrations within each Municipality. The limitation of the study is that the current administration, which took over in 2021, has been inconsistent in leadership because of the coalition in the municipal leadership. Furthermore, giving an overview of the previous 2011 local government administration and the first 3 years of the 2016 local government administration (the previous administration) would be critical to create a context for decision-makers. This is because ordinary stakeholders, like the citizens, might need to decide whom to vote for and put into power in the future, as there will be another election in subsequent years and in subsequent years. Thus, this paper may assist in giving a bigger picture of how metropolitan municipalities have managed their financial resources. This paper aims to evaluate and analyse the financial performance of South African metropolitan municipalities for the 2014/15 to 2017/18 financial years. Thus, the paper analyses the years covering the 2011 and 2016 administrations.

Consequently, the objectives of the paper are to:

- Evaluate the financial performance of 2011 vs. 2016 local government administrations.
- Determine whether metropolitan municipalities' financial performance is within the standard norms and
- Rank municipalities according to their performance levels.

As such, this study makes a critical contribution to the decision-makers, especially concerning financial management. The administrators of municipalities would be interested in knowing how municipalities had performed previously and put measures in place to either sustain this performance or to improve the performance where needed.

The overall paper is structured as follows: Section 2 briefly outlines the study's theoretical framework, which is followed by Sect. 3, where the literature review is discussed related to this study. Section 4 covers the research design and methodology used and the data analysis. Whereas Sect. 5 provides a discussion of the results. Lastly, Section 6 provides concluding remarks and further recommendations.

2 Theoretical Framework

The stakeholder theory was developed and is used mainly in management studies (Abdullah & Valentine, 2009). The idea was initially presented by Freeman (1984) as a realistic, practical, and ethically acceptable approach to managing private enterprises (Flak & Rose, 2005). The stakeholder theory originates from private sector organisations. However, it is also applicable to the public sector for management decision-making or organisational understanding and implementation (Bunget et al., 2014). Flak and Rose (2005) cite Freeman (1984), who understands that for an organisation to have a competitive edge, it must focus on maximising shareholder value and meeting the requirements of numerous stakeholders. The idea focuses on compliance and measuring performance against goals and targets (Chambers et al., 2015). According to Bunget et al. (2014), the theory also emphasises the responsibility of the Municipality to disclose financial information to its stakeholders concerning their essential activities.

Most of the research based on stakeholder theory addresses social responsibility concerns and organisational performance reporting concerning society. However, several other studies (Jensen, 2001; Dimovski & Skerlavaj, 2004; Parmar et al., 2010; Harrison & Wicks, 2013; Bunget et al., 2014; Waheed & Zhang, 2020) employed the stakeholder theory to evaluate an organisation's performance. Thus, in the study context, municipal managers need to ensure that they maximise their stakeholders' wealth by ensuring that the municipal financial performance is within and above the required standard norms concerning financial performance.

Some stakeholder theory weaknesses have been highlighted by Jensen (2001) and include the fact that since stakeholders sometimes have conflicting interests, there are no guidelines offered by the theory in specifying the trade-offs among these conflicting interests. Jensen (2001) suggests that because of this weakness, the theory leaves managers unsure of which stakeholder they need to prioritise, and this confusion results in managers being unable to make purposeful decisions. Jensen (2001) further indicates that managers cannot make purposeful decisions, which results in a lack of accountability. However, due to the weaknesses of the stakeholder theory, the 'enlightened stakeholder theory' is a better alternative. As the traditional theory recommends, there is still value maximisation for the stakeholders. However, in the enlightened stakeholder theory, the focus is on the organisation's objectives, as this solves problems that arise due to multiple objectives that arise from traditional stakeholders.

When one measures the financial performance of municipalities, one needs to consider the primary mandate of municipalities, which is to render services to their communities and be guided by the Municipal Finance Management Act 56 of 2003 (RSA, 2003). For example, a typical conflict of interest can be noted in some municipalities, where some residents are not prepared to pay for services, yet there is an expectation of service provision. On the other hand, the suppliers of these services need payment for services rendered but are also not prepared to render these services if there is non-payment from the municipalities.

Thus, the stakeholder theory fits well into this study, focusing on maximising all stakeholders' values. This calls for compliance with legislation by municipalities, as the MFMA provides guidelines on how municipal managers should manage municipalities and provide service to their communities.

3 Literature Review

3.1 Local Government in South Africa

The South African Local Government, often known as municipalities, was formed by the South African Constitution to provide services to all communities. Metropolitan municipalities are frequently located in urban areas, and each Municipality has its own council. This paper will focus on the metropolitan municipalities, which consists of eight municipalities, namely Buffalo City, City of Ekurhuleni, City of Cape Town, City of Johannesburg, City of Tshwane Mangaung Municipality and Nelson Mandela Bay, in no particular order.

The constitution and additional legislation, such as the Municipal Finance Management Act of 2003 (Act 56 of 2003), the Municipal Systems Act of 2000 (Act 32 of 2000), and the Municipal Structures Act of 1998, control South African local governments (Act 117 of 1998). These articles of legislation govern municipal institutions, such as the appointment of major role actors such as mayors. The MFMA and PFMA Acts provide the principles and duties for financial management. Because the study is confined to municipalities, the focus will be on the Municipal Finance Management Act (MFMA) legislation.

3.2 Municipal Financial Statements

In the South African municipalities' context, the annual financial statements must be prepared per the guidelines provided in the MFMA Sections 126 and 127, and the annual report consists of financial and non-financial performance. The financial statements comprise four main statements: the Statement of Financial Performance, the Statement of Financial Position, the Statement of Changes in Net Assets, and the Cash Flow Statement. This study is limited to the data obtained from the Statement of Financial Performance and the Statement of Financial Position.

Furthermore, Section 122 of the MFMA indicates that every Municipality must prepare annual financial statements to present its performance against budget, its management of revenue, expenditure, assets, and liabilities, financial results, and position as at the end of the fiscal year (Republic of South Africa, 2003; Ababio, 2007). Thus, accounting in municipalities also includes reporting on the progress, performance, failures, achievements, and actual versus intended results (Ababio, 2007; Munzhedzi, 2021).

Budget planning and preparation, appropriation, budget implementation, accounting, financial reporting, and audit and assessment are at the heart of public financial management (Sibanda, 2017; Nzama, 2023). This study is thus limited to financial reporting and financial statements used for reporting purposes.

Mantzaris (2014) recommends that municipal stakeholders, such as municipal officials, mayors, ward councillors, etc., have a solid fundamental understanding of the MFMA and the associated legislation related to financial management, as well as the implementation thereof.

3.3 Issues in Financial Reporting

The South African local government finance system is fundamentally inefficient in serving many communities, and inadequate financial management is to blame (Cameron, 2010; Nzama, 2019; Nzama, 2023). Literature indicates that financial management and reporting issues might be due to many underlying factors (Glasser & Wright, 2020), including municipalities' internal processes, such as lack of proper financial management due to under-collection or uncontrolled revenue spending (Glasser & Wright, 2020; Nzama, 2023).

Another financial reporting issue is inadequate record-keeping, which makes it difficult for auditors to perform an audit, examine financial statements, and provide assurance to the stakeholders and stakeholders to hold municipal officials accountable for their actions (Sibanda, 2017; Nzama, 2023). Therefore, adequate record-keeping is crucial for proper financial reporting, which ensures that information is accessible for financial reporting (Sibanda, 2017; Nzama, 2023). As a result, municipalities decline if sound financial management procedures are not implemented (Mantzaris, 2014). Despite these issues in financial reporting, municipalities still need to evaluate their financial performance for accountability purposes (Swanevelder, 2005; Mantzaris, 2014; Munzhedzi, 2021; Nzama, 2023).

3.3.1 Analysing Financial Performance

According to Mantzaris (2014), solid financial management and excellent governance ensure a municipality's financial viability and are listed as one of the five nationally important performance areas defined in the municipal performance legislation for municipal, as well as all other managers. Excellent municipal financial performance emphasises the need for financial management and control mechanisms to show the public how the Municipality functions (Sibanda, 2017). Financial analysis and planning are involved with (a) monitoring the Municipality's financial situation, (b) identifying the requirement for expanded or decreased service supply capacity, and (c) deciding what funding is necessary (Ntonzima, 2011). When analysing municipal financial statements, the financial statements considered are statements of financial position and financial performance. Sibanda (2017) suggests that good supervision may aid local governments in determining patterns in the ratios that may identify areas of concern. Ntonzima (2011) warns that although the analysis is applied in an accrual-based financial statement, that should not be a limitation, as the underlying objective of analysing financial statements is to assess the municipal cash flow and assist in developing plans to ensure adequate cash flow and to support municipal goals.

Furthermore, when analysing the financial performance of municipalities, it is vital to remember that financial indicators might not accurately indicate what is happening in the municipalities, as the underlying factors may differ from what is perceived or assumed. For example, Van Schalkwyk (2016) warns that consumer debt can grow year by year. Municipal managers must evaluate whether an increase is solely due to tariff increases or whether collections have decreased from year to year. Van Schalkwyk (2016) further suggests that the number of consumer debtors may drop due to debt being written off and not because there was an improvement in the data collection process.

4 Research Design and Methodology

This paper aims to evaluate and analyse the financial performance of the municipalities in South Africa. The research design chosen for this study is the case study method. The paper adopted a quantitative approach using secondary data. The secondary data of municipal financial reports, Quantec Population Database and the South African Auditor General (AGSA) MFMA audit outcome reports for the 2014/15 to 2017/18 financial years address the research objectives. The 2014/15 financial years covered the last year of the 2011 local government administration, as it exited in 2011, and the 2015/16 to 2017/18 financial years covered the first 3 years of the new 2016 local government administration. Therefore, 4 years between 2011 and 2016 administration periods. Selecting these years would assist in evaluating how the state of these municipalities was before the 2016 local government administration compared to the first 3 years under the previous administration. Thus, this resulted in evaluating performance trends in the two local government administrations.

The study population was purposeful, and all eight South African metropolitan municipalities were considered and analysed for the four administrative years included. Thus, the study's sample included the full population of South African municipalities.

4.1 Data Analysis

Four categories of measures are used to evaluate municipalities' financial performance. These are cash solvency, budget solvency, long-term solvency, and service-level solvency. Three variables are used under the cash solvency category: cash ratio, acid-test ratio, and current ratio. The operating and surplus/deficit per capita ratios are variables used in the budget solvency category. In the third category of financial measurement, the long-term solvency, net asset ratio, long-term liability ratio, and per capita ratios are included as variables. Lastly, in the last category, the service level solvency, the municipality tax per capita ratio, revenue per capita and expense per capita ratio are used to measure financial performance. Therefore, eleven (11) variables are used to evaluate and analyse the financial performance of municipalities.

These data were analysed using the descriptive analysis in the SPSS system. The mean for each financial performance was analysed, and the rankings per Municipality in terms of performance were evaluated and analysed. The averages over the financial period of the study were considered. The three averages, mean and median, were also considered when analysing the municipal financial performance, also known as the "measures of central tendency" (Denscombe, 1998).

The researcher sought ethical permission from the School of Accountancy Ethics Committee at the University of Johannesburg. This guarantees that the study was done ethically and that no harm was done. This study has received ethical approval; the ethical number is SAREC20210624/01.

5 Results and Discussion

Any South African Metropolitan Municipality undertakes accounting operations by preparing financial statements per the "MFMA and Generally Recognised Accounting Practices (GRAP)" and using a cash-based accounting system. The municipalities' annual reports, the AGSA reports, and the Quantec Population Database for the 2014/15 to 2017/18 financial years were used to analyse the financial condition. The analysis consisted of 11 ratios (variables). The study focused on financial performance for the 2011 and 2016 administrations to evaluate any significant changes in municipal performance considering different administrations within each Municipality. The limitation of the study is that the current administration, which took over in 2021, has been inconsistent in leadership because of the coalition in the municipal leadership. Furthermore, giving an overview of the previous 2011 local government administration and the first 3 years of the 2016 local government administration (the previous administration) would be critical to create the context for decision-makers.

5.1 Cash Solvency

Liquidity and effective cash management are linked to cash solvency. Under the cash solvency category, the question to be answered is, “Does the municipality have the ability to create cash within 20 or 60 days for paying its debts?” (Groves, 1980; Carmeli, 2002). Three variables were used to assess cash solvency: cash, acid-test, and current. The ability to pay off short-term debt is an essential sign of financial health (Özkul & Alkan, 2017).

If municipalities cannot pay their short-term obligations, their borrowing will rise, increasing expenditure, which may result in the Municipality losing its legitimacy as a good-standing municipality. In addition, municipalities that delay payments for products and services cause suppliers to include a late payment penalty in their prices for goods and services, further increasing long-term costs. (Özkul & Alkan, 2017). In the South African context, these costs can include interest and penalties raised on the debt, resulting in wasteful expenditure (Nzama, 2019; Auditor General of South Africa, 2021). The AGSA (2021) reports that interest and penalties contributed 69% of the wasteful R3,47 billion expenditure in the 2019/20 financial year.

Özkul and Alkan (2017) postulate that salary payments are not paid when municipalities struggle with cash management, as municipalities generally prefer not to pay salaries when there is a cash shortage. In 2019, there were reports that more than thirty municipalities could not pay their employees’ salaries (IOL, 2019) due to cash management constraints. At the Amathole District Municipality, the municipal manager reportedly justified that there was a lack of revenue collection as they only collected 25% of revenue in the first two quarters of the 2020/21 FY (News24, 2021).

In Fig. 1, The cash ratio is the relationship between money and cash equivalents and short-term liabilities/debts. It calculates how much liquid assets are required to satisfy short-term debts. (Carmeli, 2002; Özkul & Alkan, 2017). This ratio reflects the Municipality’s pressing need for funds. A declining quantity of cash and cash equivalents as a proportion of current liabilities is harmful since it indicates that the Municipality is less capable of meeting its short-term obligations (Özkul & Alkan, 2017). The cash ratio must be more than “0.20.”For municipalities, this ratio must be higher to not fall into a shortage of cash (Özkul and Alkan (2017).

Buffalo City had the highest average cash ratio between 2014/15 and 2017/18 FY, followed by the City of Ekurhuleni, the City of Cape Town, and the City of Johannesburg, with all these municipalities having more than a “0.20” cash ratio. The municipalities with the lowest average cash ratio were the City of Tshwane, with an average of “0.03”.

Figure 2 shows the acid test ratio by dividing cash and cash equivalent by the total sum of short-term liabilities (Özkul & Alkan, 2017). An acid-test ratio of “1” is

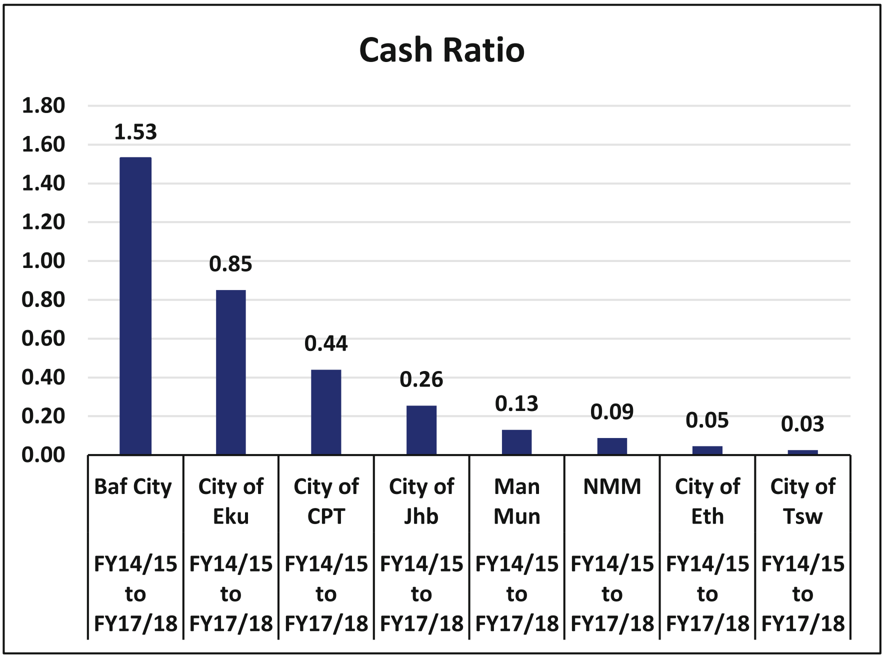

Fig. 1 Cash Ratio of South African Metropolitan Municipalities. Source: Authors' analysis using municipalities data (annual reports & financial statements), 2014/15–2017/18 based on Özkul and Alkan (2017)

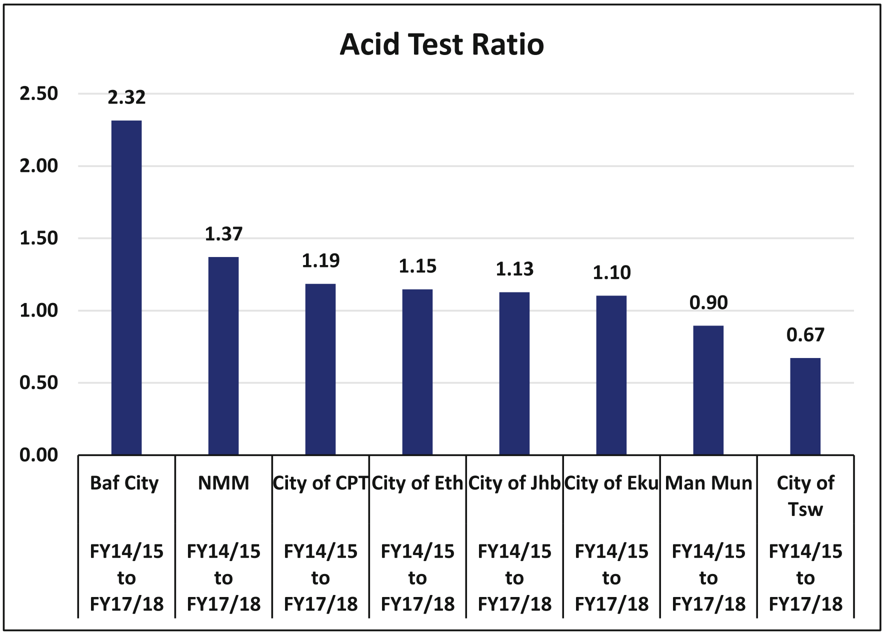

Fig. 2 Acid Test Ratio of SA Metropolitan Municipalities. Source: Authors' analysis using municipalities data (annual reports & financial statements), 2014/15–2017/18 based on Özkul and Alkan (2017)

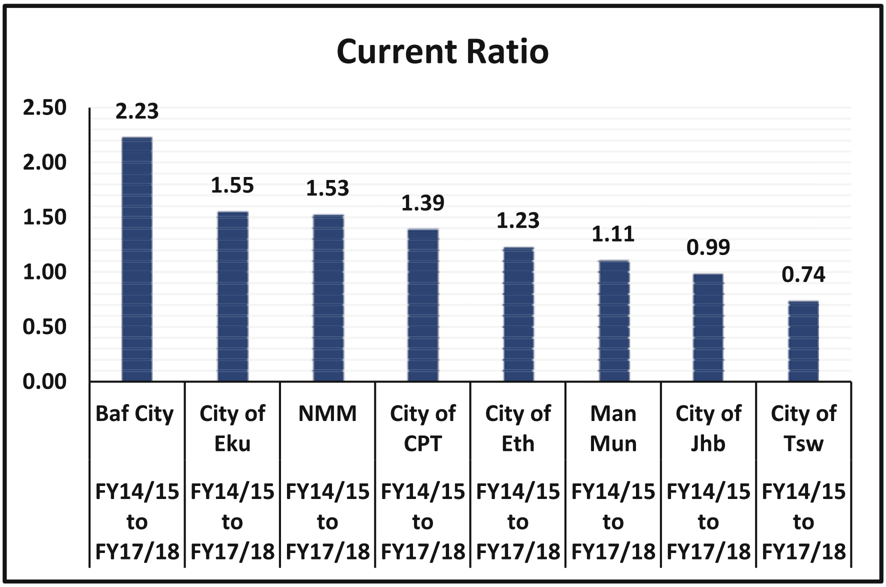

Fig. 3 Current Ratio of SA Metropolitan Municipalities. Source: Authors' analysis using Municipalities data (annual reports & financial statements), 2014/15–2017/18 based on Özkul and Alkan (2017)

considered sufficient. As a result, the Municipality's short-term debts can be paid entirely with cash, and assets can be converted to cash fast.

The overall average acid test ratio for South African municipalities has been above the required norm of one, with the FY 2014/15 being lowest at "1.09" and the highest in 2015/16 at "1.44", which decreases subsequently. Thus, this may indicate that the political administration of 2011 had a less-than-average performance than the 2016 political administration, although there has since been a drop from the first year of the 2016 administration in the 2015/16 financial year.

Buffalo City had the highest average acid test ratio between 2014/15 and 2017/18 FY, followed by Nelson Mandela Bay, the City of Cape Town, the City of eThekwini, the City of Johannesburg, and the City of Ekurhuleni, with all these municipalities having more than "1" recommended acid test ratio. The municipalities with the lowest average acid test ratio were the Mangaung Municipality and the City of Tshwane, each having an average of "0.90" and "0.67", respectively.

Reflecting on the point raised by Özkul and Alkan (2017) when evaluating the acid test ratio, it is important not to merely assume that the high acid test ratio is good as other underlying factors might affect the revenue of the specific Municipality. Interestingly, the Nelson Mandela Bay Municipality had the second-highest average of the acid test ratio of "1.37" between 2014/15 and 2017/18 FY. Nevertheless, in the 2019/20 FY, it was among municipalities with revenue challenges (AGSA, 2021). Nelson Mandela Bay Municipality was reported to have lost revenue estimated at R11,six million, which was supposed to have been raised but not raised (AGSA, 2021). Thus, there should be proper financial management and internal control within municipalities.

In Fig. 3, the current ratio is calculated by dividing the total sum of current assets by short-term liabilities (Carmeli, 2002; Özkul & Alkan, 2017). Özkul and Alkan

(2017) theorize that this ratio assesses a municipality's liquidity by determining how much of the Municipality's current liabilities can be covered by current assets. A current ratio of "2.00" is considered sufficient as a rule of thumb, while a current ratio of "1.00" is considered a safety limit for the Municipality's payment capability to provide services to the public and pay off its debts when they are due (Carmeli, 2002). The higher the current ratio, the higher the Municipality's capability to pay off its debts (Carmeli, 2002). The overall average current ratio for municipalities has exceeded the required norm of "1.00". Thus, this may indicate that the political administration in 2011 had the highest average performance compared to the 2016 political administration.

Buffalo City had the highest average current ratio between 2014/15 to 2017/18 FY of 2.23—followed by City of Ekurhuleni, Nelson Mandela Bay, City of Cape Town, City of eThekwini and Mangaung Municipality, with all these municipalities having an average current ratio above the required norm of "1", which is acceptable. However, the City of Johannesburg's ("0.99") and City of Tshwane's ("0.74") current ratios were below the required norm. Thus, this could suggest that these municipalities had liquidity issues.

5.2 Budget Solvency

The ability of a municipality to generate enough revenue to fund and sustain a given level of service is referred to as budget solvency (Özkul & Alkan, 2017). The question that needs to be answered is, "Does the municipality create enough income during the ordinary budget duration to meet its expenses and not enter into a budget deficit?" (Groves, 1980; Carmeli, 2002). Two variables used to measure the budget solvency category are the operating and surplus/deficit per capita ratios.

The balance between revenue and expenses is one of the most important indications of a sound financial structure (Özkul & Alkan, 2017). Özkul and Alkan (2017) postulate that expenses incurred due to interest or penalties might reduce available resources to render services to consumers.

In Fig. 4, the operating ratio is calculated by dividing the total Municipality's sum of income by its total expenses (Özkul & Alkan, 2017). This ratio depicts the relationship between revenue input and expenditure outflow. A budget surplus of more than "1.00" implies a budget surplus, whereas a budget deficit of less than "1.00" suggests a budget deficit (Özkul & Alkan, 2017). A high ratio indicates that the government was optimistic and is regarded favourably.

It is observed that the mean has been somewhat constant for the period under review as it ranges between "0.91" and "0.92" in the 2014/15 to 2017/18 FYs. The highest average of "0.93" was noted in the 2015/16 financial year. However, these average ratios are below the required norm of "1" but not far from the norm, around "0.9". This indicates that the municipalities had a slight budget deficit in 2011 and 2016. This is consistent with the observations made by AGSA (2021), which indicates that most municipalities struggle to raise revenue (AGSA, 2021).

2014/15–2017/18 based on Özkul and Alkan (2017).

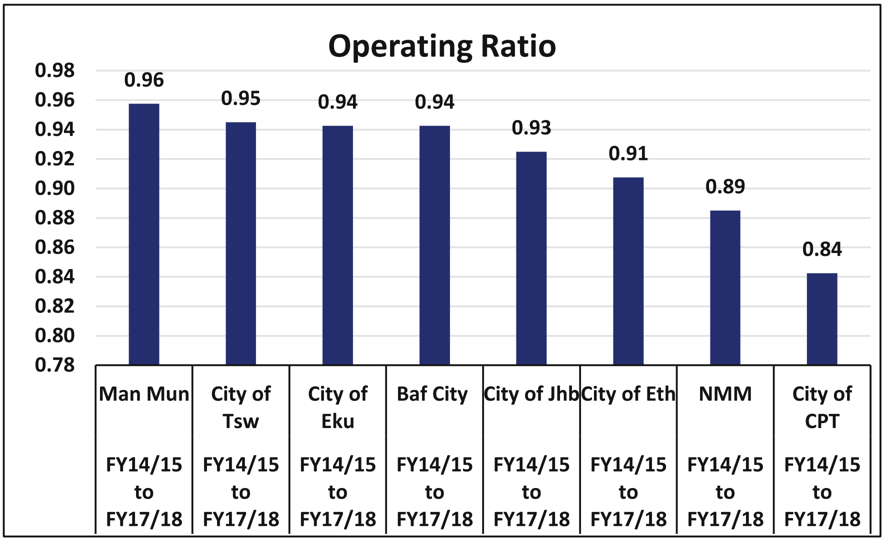

Fig. 4 Operating Ratio of SA Metropolitan Municipalities. Source: Authors' analysis using Municipalities data (annual reports & financial statements), 2014/15–2017/18 based on Özkul and Alkan (2017)

In Fig. 5, the surplus/deficit per capita ratio is calculated by dividing the budget deficit or surplus by the municipality population (Özkul & Alkan, 2017). This ratio depicts the Municipality's budget deficit or surplus per capita. A higher significant value indicates excellent budget solvency for these ratios.

Municipalities had a positive average surplus from 2014/15 to 2017/18 FY, which is a good sign (Carmeli, 2002; Özkul & Alkan, 2017). In the last year, 2014/15 of the 2011 political administration, the average surplus/deficit per capita was 628, lower than the first 3 years of 2016. When answering the question posed by Groves (1980) in the introduction of this section, "Does the municipality create enough income during the ordinary budget duration to meet its expenses and not enter into a budget deficit?". The answer is no, and all eight metropolitan municipalities did not have an average of "1" for the period of study, which is in line with the observation made by AGSA (2021) and Glasser and Wright (2020) that municipalities often do not raise and collect revenue due to them.

5.3 Long-Term Solvency

Long-term solvency measures a municipality's future resource availability (Özkul & Alkan, 2017). The question in this category is: "Does the government have the ability to pay all of its activity costs, both ordinary and extraordinary?" (Groves, 1980; Carmeli, 2002). Three variables were used to measure the long-term solvency: net asset ratio, long-term liability ratio, and long-term liability per capita ratio. These

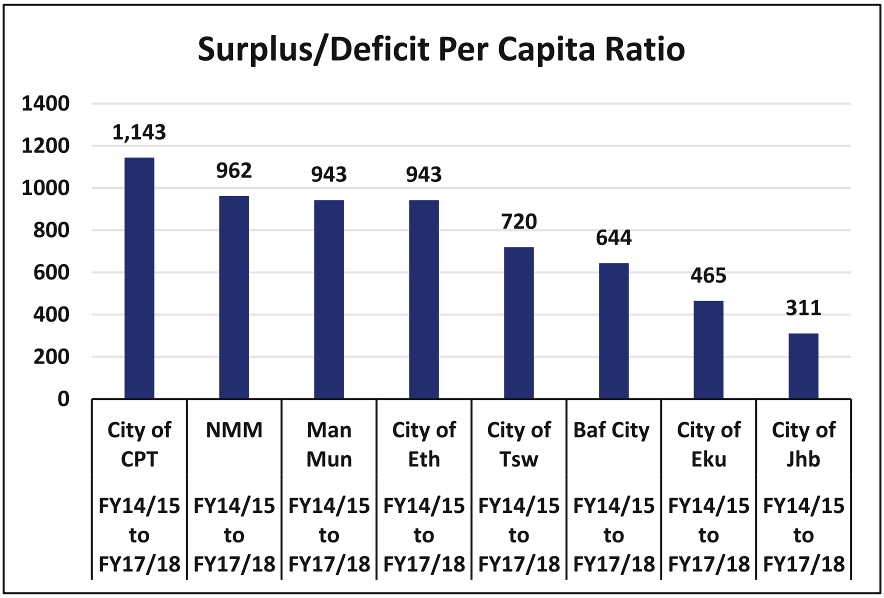

Fig. 5 Surplus / Deficit Per Capita of SA Metropolitan Municipalities. Source: Authors' analysis using Municipalities data (annual reports & financial statements)

ratios assessed a municipality's ability to service long-term debt (Özkul & Alkan, 2017). Municipalities might take long-term loans from the Treasury or the financial sector to make significant investments. However, if the Municipality's long-term debt repayment capacity is low, it may not acquire fresh funds for needed expenditures and services (Özkul & Alkan, 2017). Özkul and Alkan (2017) further argue that municipalities may be obliged to pay higher interest if they obtain funding, irrespective of their financial standing. Thus, the combination of the three variables has both a negative and positive relationship, with the net asset ratio having a negative relation with the long-term liability ratio and long-term liability per capita, whilst the latter has a positive relationship with the long-term liability ratio (Özkul & Alkan, 2017).

In Fig. 6, the net asset ratio measures the Municipality's portion of net assets compared to its total assets (Özkul & Alkan, 2017). It establishes how much of the total assets have been paid for and how much is still classed as a debt. This financial indicator depicts a municipality's anticipated spending and financial capability. It also suggests the ability to weather economic downturns and emergencies. A higher ratio indicates more long-term solvency. The older the Municipality's assets are, the closer this ratio is to "1" (Özkul & Alkan, 2017), indicating that municipalities own assets. The Municipality's average net asset ratio has remained constant throughout 2014/15 to 2017/18 FY, and this average was below the required norm throughout. Thus, the performance has been the same for the 2011 and 2016 administrations.

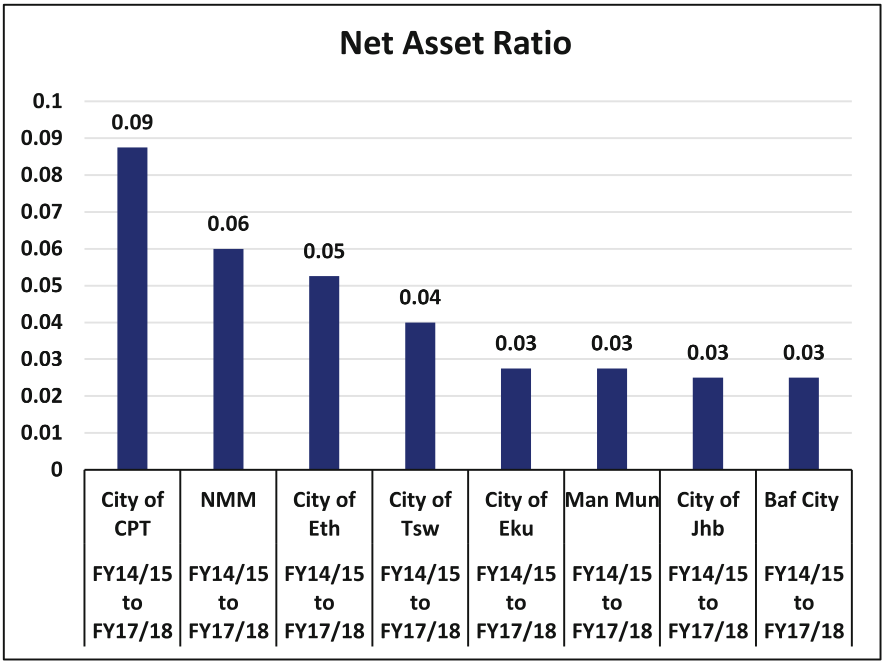

Fig. 6 Net Asset Ratio of SA Metropolitan Municipalities. Source: Authors' analysis using Municipalities data (annual reports & financial statements), 2014/15–2017/18 based on Özkul and Alkan (2017)

In Fig. 7, The long-term liability ratio compares long-term obligations to total assets to assess the Municipality's capacity to repay long-term debt (Özkul & Alkan, 2017). The ratio is computed by dividing the sum of long-term debts by total assets. This ratio indicates how much of the Municipality's total assets can be used to pay off long-term obligations; if it is low, it is in excellent shape. A greater ratio indicates a worse ability to pay off long-term debt (Özkul & Alkan, 2017). The Municipality's average long-term ratio has remained constant throughout 2014/15 to 2017/18 FY, and this average was low throughout. As per Özkul and Alkan (2017), it is a good indication that municipalities may pay their debts.

The City of Tshwane had the highest long-term ratio, followed by the City of Johannesburg between 2014/15 and 2017/18 FY of "0.37" and "0.33", respectively. Buffalo City Municipality had the lowest average long-term ratio between 2014/15 and 2017/18 FY. This indicates that Buffalo City Municipality was in good financial condition compared to the City of Tshwane and Johannesburg.

As presented in Fig. 8, the long-term liability per capita ratio is calculated by dividing the sum of long-term liabilities by the population (Özkul & Alkan, 2017). Like the prior ratio (the long-term liability), A more excellent ratio indicates a lesser ability to pay off long-term debt. This ratio must be low since it represents long-term debt per inhabitant inside the Municipality's limits (Özkul & Alkan, 2017). Özkul

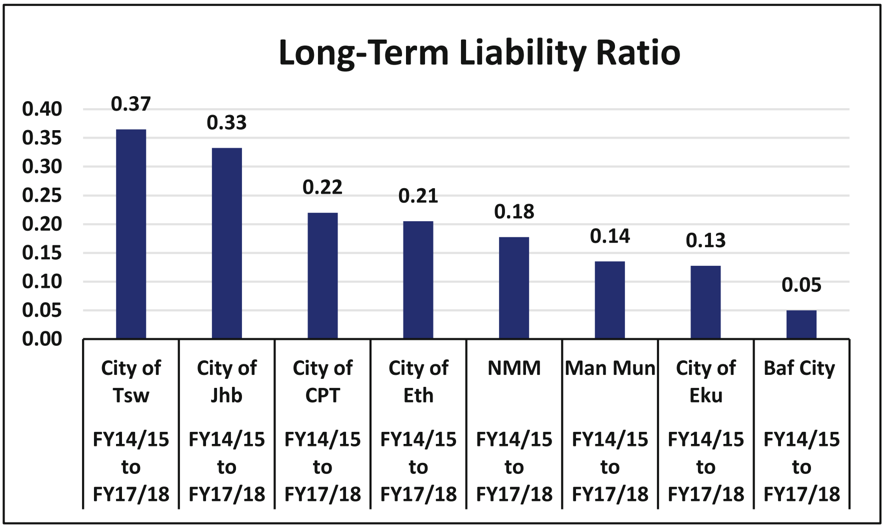

Fig. 7 Long-Term Liability Ratio of SA Metropolitan Municipalities. Source: Authors' analysis using Municipalities data (annual reports & financial statements) for 2014/15–2017/18, World Population Review and Quantec data based on Özkul and Alkan (2017)

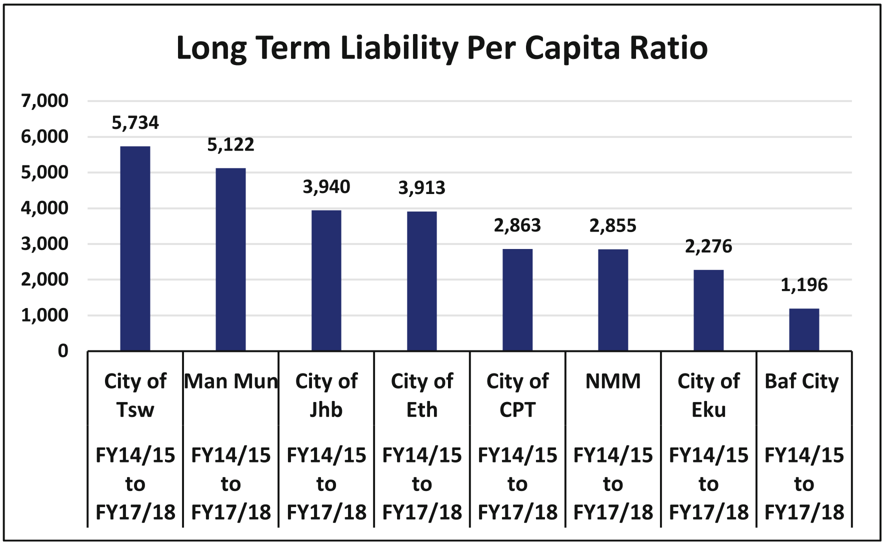

Fig. 8 Long-Term Liability Ratio of SA Metropolitan Municipalities. Source: Authors' analysis using Municipalities data (annual reports & financial statements) for 2014/15–2017/18, World Population Review and Quantec data based on Özkul and Alkan (2017)

and Alkan (2017) posit that the higher debt levels per individual may imply diminishing long-term solvency. It also implies a long-term decline in service delivery levels. The Municipality's average long-term liability per capita ratio ranged between R3,200 and R3,600 between 2014/15 and 2017/18 FY. This is too high considering the country's economic state since South Africa has the highest unemployment rate compared to other countries, with a current unemployment rate of 34.4% (Reuters, 2021). Thus, municipalities will incur high expenses per person, yet the same person might not pay for the services the Municipality provides.

The City of Tshwane had the highest long-term ratio, followed by the Mangaung Municipality. This indicates that Buffalo City Municipality was in excellent financial condition compared to the Tshwane and Mangaung Municipalities. It should also be noted that the City of Johannesburg and the City of eThekwini had an average long-term liability per capita above the average from 2014/15 to 2017/18 FY.

5.4 *Service-Level Solvency*

The ability of a municipality to pay for and maintain its current service levels is measured by service-level solvency (Özkul & Alkan, 2017). The question to answer in this category is: "Does the municipality have the ability to supply quality health and welfare services (or any other service) for the community, as requested by the public?" (Groves, 1980; Carmeli, 2002). Three variables measure service-level solvency: tax per capita ratio, revenue per capita, and expenses per capita. According to Özkul and Alkan (2017), the expenditure per capita ratio represents the cost of services per person, and the tax per capita and the revenue per capita ratio represent the tax and revenue burden residents face.

In Fig. 9, The tax per capita ratio quantifies the link between taxes paid per person (Özkul & Alkan, 2017). The ratio is determined by dividing total taxes by

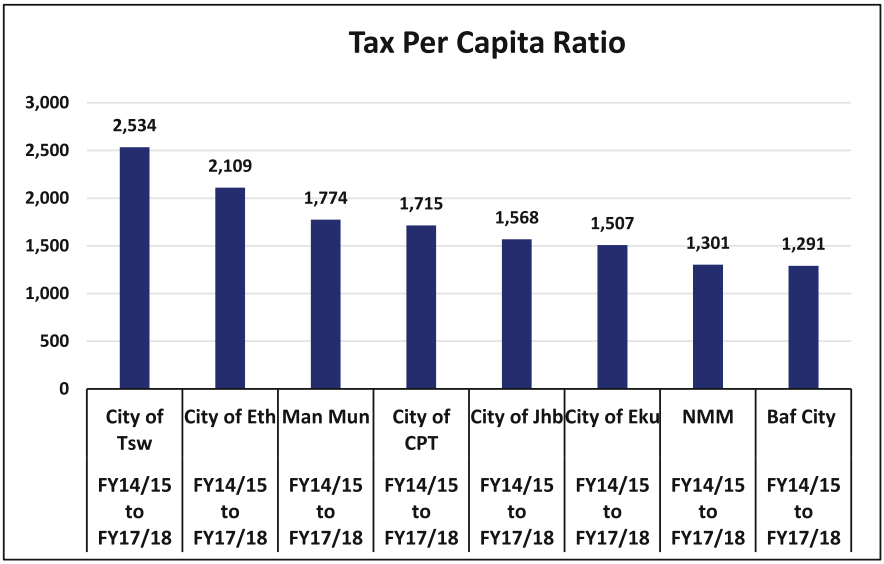

Fig. 9 Tax Per Capita Ratio of SA Metropolitan Municipalities. Source: Authors' analysis using Municipalities data (annual reports & financial reports) for 2014/15–2017/18, World Population Review and Quantec data based on Özkul and Alkan (2017)

population. This percentage represents the average amount of taxes collected from an individual. It also determines how much tax is collected per inhabitant to satisfy responsibilities and costs (Özkul & Alkan, 2017). As another source of revenue for municipalities, South African municipalities may charge taxes and generate revenue from property rates, service charges—electricity revenue, and services changes—water revenue and other revenue, such as investment income, rentals, etc. (AGSA, 2021).

The municipalities' average tax per capita ratio increased from 2014/15 to 2017/18 FY. The average tax per capita was R1,518 in 2014/15 FY and R1,995 in 2017/18 FY. The City of Tshwane had the highest tax per capita ratio, followed by the City of eThekwini between 2014/15 and 2017/18 FY of R2,534 and R2,109. This indicates that Buffalo City Municipality was in an excellent financial condition compared to the City of Tshwane and eThekwini. From the table, it can also be noted that the City of Tshwane and the City of eThekwini are burdened with further tax obligations.

In Fig. 10**,** The revenue per capita ratio compares all public funding linked with population change to its present income base (Özkul & Alkan, 2017). Özkul and Alkan (2017) posit that the high ratio and increasing trend concerning revenue per capita are generally desirable for municipalities. Since the high ratio suggests the Municipality has reached the limits of its revenue-generating capacity, this reduces its flexibility in obtaining additional revenue (Özkul & Alkan, 2017). Özkul and

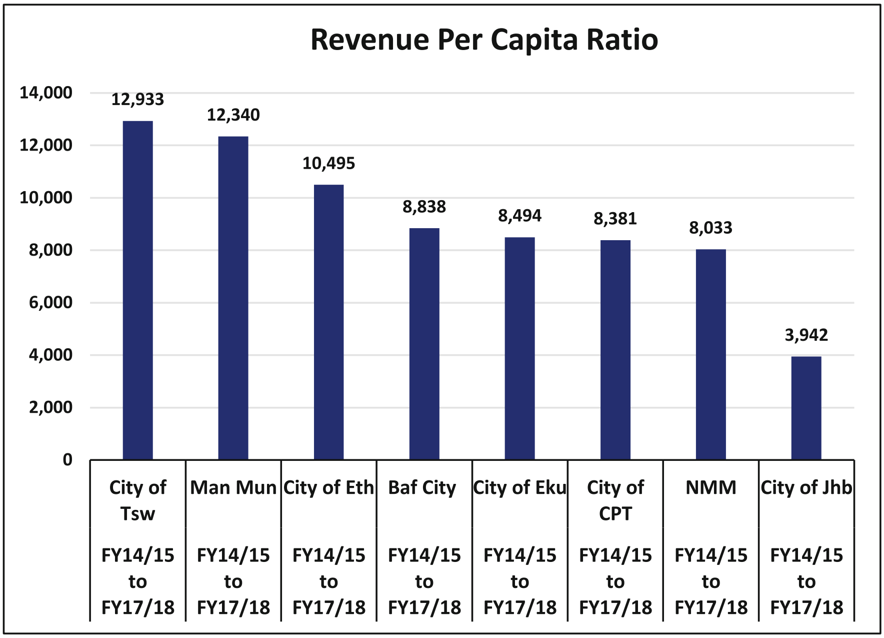

Fig. 10 Revenue Per Ratio of SA Metropolitan Municipalities. Source: Authors' analysis using Municipalities data (annual reports) for 2014/15–2017/18, World Population Review and Quantec data based on Özkul and Alkan (2017)

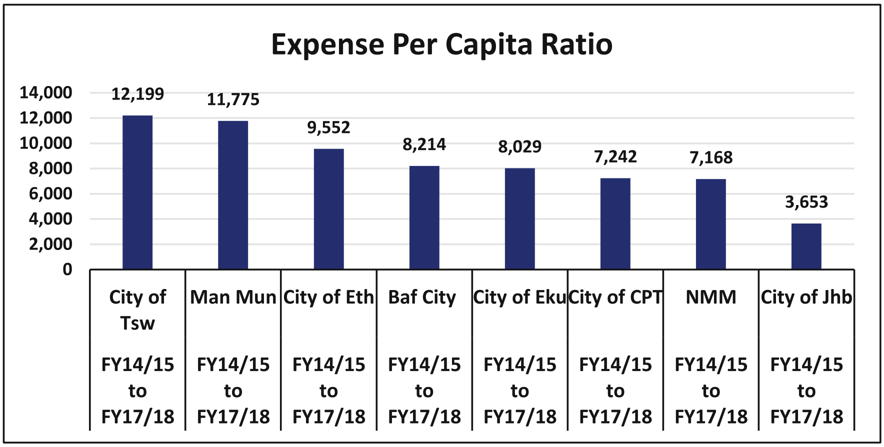

Fig. 11 Expense Per Capita Ratio of SA Metropolitan Municipalities. Source: Authors' analysis using Municipalities data (annual reports) for 2014/15–2017/18, World Population Review and Quantec data based on Özkul and Alkan (2017)

Alkan (2017) argue that while a low ratio is typically undesirable, it may signal that the Municipality has a more considerable ability to generate additional money.

The Municipality's average revenue per capita ratio increased from 2014/15 to 2017/18 FY. The average tax per capita was R8,560 in the 2014/15 FY and R9,634 in the 2017/18 FY. The City of Tshwane had the highest revenue per capita ratio, followed by Mangaung Municipality between 2014/15 and 2017/18 FY of R12,933 and R12,340. The City of Johannesburg Municipality had the lowest average revenue per capita ratio over 2014/15 and 2017/18 FY of R3 942.

In Fig. 11, the expense per capita ratio compares the total expenditure of the Municipality with the municipal population (Özkul & Alkan, 2017). Özkul and Alkan (2017) conceive that this ratio is essential to measure the Municipality's level of sustainability of its service delivery, and the ratio also indicates the cost-of-service delivery per capita. Özkul and Alkan (2017) indicate that when the expense ratio is high, it indicates inefficiencies, as the Municipality's cost of rendering services may exceed the residents' ability to pay for those services.

The Municipality's average expense per capita ratio increased from 2014/15 to 2017/18 FY. The average tax per capita was R7,932 in the 2014/15 FY and R8,889 in the 2017/18 FY. These increasing averages are undesirable and may indicate inefficiency or high costs. Although the City of Johannesburg's expense per capita is the lowest, it is still high considering the state of the South African economy and the unemployment rate. The City of Tshwane had the highest expense per capita ratio, followed by Mangaung Municipality between 2014/15 and 2017/18 FY of R12,199 and R11,775.

6 Conclusion

This paper has evaluated and analysed the financial performance indicators of South African municipalities as such analysis may be beneficial for all stakeholders of municipalities to review and understand for decision-making and accountability purposes, as explained in the theoretical framework section. The paper concludes that the municipal financial performance between the 2014/15 and 2017/18 financial statements has been consistent. Only four of the eleven variables used changed over time—the long-term liability ratio (decreased), tax per capita (increased), revenue per capita (increased), and expenses per capita (increased), resulting in long-term solvency and service-level solvency.

The paper found that Buffalo City had consistently performed well in all three variables used under the cash solvency category. In comparison, the City of Tshwane was consistent in all three variables as the worst-performing Municipality. Only four municipalities indicated proper cash management ability to pay off short-term debts within 30–60 days. Municipalities below the required norms were the City of Tshwane, the City of eThekwini, Nelson Mandela Bay and Mangaung.

In the second category, budget solvency, there was contradictory performance, as under the operating ratio, the City of Cape Town was evaluated as the worst-performing Municipality, compared to the Mangaung Municipality, which was the best-performing. While under the same category, in analysing the surplus/deficit per capita, the City of Cape Town became the best-performing Municipality compared to others, while the City of Johannesburg was the worst-performing Municipality. Under the long-term solvency category, there has been consistent performance amongst municipalities throughout the study. The best-performing Municipality under the long-term solvency category was Buffalo City. In contrast, the worst-performing Municipality was the City of Tshwane. Therefore, based on the variables, there is an indication that most municipalities cannot pay all their activity costs. In the last category, the service level solvency was consistent throughout the study, unlike the previous categories.

7 Recommendations

The study recommends that in the upcoming administration, municipalities should evaluate financial statements and other results in detail and provide the analysis in their annual reports regularly so the municipalities' stakeholders can gauge the municipalities' performance and make them accountable. The possible direction for future study may include analysing performance indicators for all categories of municipalities. Future studies may also use the MFMA Circular No. 71 financial ratios and norms, which the National Treasury recommended in 2014, as limited studies analyse municipalities' financial performance.

8 Future Research

Future research may also examine the entire local government administration, including 2015/16 to 2020/2021 financial years. The study is limited to South African municipalities. However, the world may take insights from it as it may apply to other municipalities worldwide.

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The Underrepresentation of Women in Executive Management Positions in the South African Banking Sector

Pulane Modiha and Renee Horne

Abstract This study explored factors that contribute towards the significant and continued underrepresentation of women in executive management positions within the South African banking sector. The objective of this research was to examine the interplay between first line roles within the banking sector, career progression and gender equality. What is the relationship between first line roles and career progression to executive management positions within the banking sector? This phenomenological qualitative study collected data through semi-structured interviews from a non-probability sample of 25 participants who are all banks' executives. Key findings were: it is important to choose roles that provide future career acceleration to executive positions early in career planning. Lack of suitable role models in key positions such as CEOs can lead to compression of women in support roles. Sponsors play important part in women careers developments. Finally, there is a connection between first-line roles and advancement to executive management positions. Women should acquire skills in first line roles early in their careers. When developing transformation plans and policies, banks and the government should consider and address internal (personal) and external (organisational and societal) factors affecting women career mobilities. A contribution was made by developing a theoretical framework on internal and external factors women should consider in their career growths. The framework provides insights on strategies that may be adopted to navigate through barriers and challenges emanating from, amongst other, gender biases, organisational cultures, and women's lack of self-belief. This study insights could benefit banks executives, human resources specialists and government in advancing their gender equality initiatives.

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1 Introduction

Traditionally, women and men performed roles based on their gender; however, such role segregation has recently received increasing scrutiny as it is seen to favour men over women (Doering & Thébaud, 2017). Based on previous research, executive management positions continue to be dominated by men, who appoint other men in various executive management positions due to gender bias (Nikolaou, 2017). Such role exclusion disadvantages women in several ways, including reduced employment prospects in roles usually occupied by fellow women (Kamerāde & Richardson, 2018).

The underrepresentation of women in executive management positions is an area of concern and interest for various reasons. The main interest for undertaking the study of this nature was motivated by, firstly, the role played by executive management leadership and secondly the pace in implementing gender transformation policies and programmes.

Women in the South African banking sector account for a large percentage of its total workforce. However, there was only one female CEO in the Top 40 JSE listed companies who was a banker in 2017 and had been a CEO since 2009 (PWC, 2017). She, then retired at the end of February 2019 and was replaced by a male CEO. Of the 65 South African registered banks and representative offices CEOs, only 7 are female (South African Reserve Bank, n.d.). One of these 7 female CEO resigned in January 2021, reducing the number of current CEOs to six (6). According to the Department of Labour's Commission for Employment Equity Annual Report 2018/19, there is clear evidence of underrepresentation of women at the top or executive management level positions. Female representation in top or executive management positions accounted for 23.5% versus male representation of 76.5% of top management positions (Commission for Gender Equality, 2019). Consequently, men dominate top executive positions in both private and public sectors in South Africa.

Though the statistics above provide a South African view, the underrepresentation of women in executive management positions is no different globally. For example, while women represent more than 50% of employees within the Global Finance industry, statistics indicate that within S&P 500 companies only 5.8% of women are Chief Executive Officers (CEOs), 26.5% occupy executive management positions and 36.9% occupy junior to middle management positions (Catalyst, 2020).

The empirical focus of this study is on the underrepresentation of women in executive management positions, with the main emphasis on women being significantly underrepresented in key decisions making positions of first line business within the banking industry. Literature on women in the workplace demonstrate a narrowing trend relating to women ascension to executive roles (Madsen et al., 2020; Gebbels et al., 2020; Hejase, 2020).

Many women occupy junior to middle management roles, additionally those women who are in executive management positions occupy support roles (Farooq et al., 2020). Due to the increasing demand for diversified leadership and necessity for gender equality, the focus of women representation in executive management positions permits further examination (Gewinner, 2020). A further scrutiny of the executive roles that provides women with power is warranted (Abdallah & Jibai, 2020).

A study by Holst and Friedrich (2016) of the Top 100 banks in Germany revealed that women are less likely than men to hold senior management position across all the sectors of the economy. However, the gap between women and men in the Finance & Insurance sector is much wider when compared to other sectors. This implies that gender transformation at senior management levels for the Finance and Insurance sector is slower than in other sectors. Holst and Friedrich's (2016) study is significant because the data used was collected post the signing of voluntary agreement between the German federal government and German's leading business associations where the private sector agreed to promote gender equality. This agreement is comparable to the 2004 South Africa's Financial Sector Charter, which was a voluntary pledge by the financial sector to address social inequalities.

Whilst low underrepresentation of women in executive committees in financial services is highlighted, of concern is a significantly low representation of women in positions of power. The positions of power or key business functions in charge of strategy and financial performances are referred to as first line of defence, which is the business area where employees are responsible for generating revenues, identifying business risks, and managing the business risks emanating from business activities (Zhivitskaya, 2015).

The first line of defence's responsibility is to generate income, own and manage business risks within set parameters and exposures. The second line of defense "includes support functions, such as risk management departments, compliance, legal, human resources, finance, operations and technology" (BIS, 2018, p. 12). The third line of defense is Internal Audit whose main responsibility is to provide assurance on business activities as identified by the first and second lines.

A large number of women is concentrated in support roles, such as Human Resources (HR), Compliance, Legal, Marketing, whilst income generating first line roles such as CEO and head of business line have the least representation of women as highlighted by the Wyman (2020).

There is a concern around the pace in which women are progressing towards the occupation of senior roles and roles that give them influence, power, and enable them to provide strategic direction in companies they are employed in, such as first line roles of a CEO and/or managing director roles (Abdallah & Jibai, 2020).

2 Literature Review

This paper aimed to explore the relationship between the representation of women in first line roles and career progressions to executive management positions in the South African banking sector. The study aimed to discover barriers and challenges perceived to be reasons for the nominal number of women in executive positions, more specifically, banks' income generating first line roles.

The theoretical framework combined social cognitive theory (SCT) developed by Bandura in 1986, social role theory established by Eagly (1987), and attribution theory founded by Heider (1958). Social cognitive theory was applied to the phenomenon of self-efficacy, which is a belief that human behaviour is a result of self-conviction no matter what the external and internal circumstances dictates (Luc, 2020). Social role theory, which was originated to understand the cause of sex differences, is considered alongside social cognitive theory (Eagly & Sczesny, 2019). Social role theory, then, contains not only a theory of social influence on how roles are chosen, but a concept of roles being characteristics which are decided based on an individual's social setting (Eagly & Wood, 2011). Like social cognitive theory, social role theory assumes that an individual's viewpoints lead to the role characteristics that they choose (Biddle, 1986). Attribution theory lends itself to studies exploring how individuals perceive causes for their successes and failures (Banerjee et al., 2020).

2.1 Social Cognitive Theory (SCT)

While conducting this research, the Social Cognitive Theory was used to an understanding of how women and men perceive themselves, and their self-efficacy when relating to occupying executive management roles within the banking sector. Bandura argued that people are constructive, self-reflective, and self-regulating species, rather than reactive organisms formed and shepherded by external events (Bandura, 1999). The application of this theory is rooted upon the idea that, there is power in self-belief when dealing with barriers imposed by organisational and social environments, which includes stereotypes about what women can achieve as executive leaders (Hill et al., 2016).

2.2 Social Role Theory

Gender roles emanate from human behaviours being categorised and assigned to a specific gender (Blackstone, 2003). Inferences are then made between male, and female based on the characteristics they possess. This subsequently leads to roles being classified and assigned based on the sex of the individual. It is further alleged that societal belief of what men or women are capable of, lead to skills and occupational roles being assigned based on the sex of an individual (Wood & Eagly, 2002). These societal believes serve as a guide for men and women households' responsibilities and work engagements (Sieverding & Hassan, 2016). The gender roles stereotypes are then carried over from one generation to the next (Mumporeze, 2020). Gender role stereotypes appear normal in everyday living, given the way individuals have been socialised from childhood (Halpern & Perry-Jenkins, 2016).

2.3 Attribution Theory

In this study, attribution theory was used to learn more about what women and men think are the root causes of women's underrepresentation in executive management positions. Malle (2011, p. 1) refers to Attribution theory, first, as an explanation of behaviour (i.e., answers to why questions); secondly, extrapolations or ascriptions (e.g., inferring traits from behaviour, ascribing blame to a person). Kelley and Michela (1980) state that attribution theory emphasises phenomenal connections, causes that explains the outcome of behaviours. Albert and Luzzo (1999) note that people's perceived cause of their successes or failures has a direct bearing on how they behave. For example, if people attribute their failures to factors outside of their control, they are then likely to do nothing about their condition, whereas if they attribute their failures to factors within their control, they may act (Lee & Hall, 2020).

3 Underrepresentation of Women in Executive Management Positions

The role of executive management is to carry out and implement the organisation's vision and mission; make decisions that have impact on the entire workforce; and implement business strategies that have an impact on society (Ou et al., 2017). The negative effect from the underrepresentation of women in executive management positions goes beyond a concern for business strategic decision making. Research has shown the ripple effect on variables such as compensation/pay (Quintana-García & Elvira, 2017), succession planning, perceptions on women's capabilities and intellect (Rathore, 2017).

4 Compensation/Pay

Gender pay gaps is wider at executive management level (Wang et al., 2019). In the context of this study, compensation/pay denotes total rewards (cash and non-cash) that an employee receives from the employer (Rahimi, 2020). Studies have attempted to cover the reason behind the continued gender pay gaps at the executive levels (Cook et al., 2019; Butkus et al.; Blevins et al., 2019; Hayes et al., 2020). However, the reason for gender pay gaps are indistinct and vary from gender prejudices (Wiler et al., 2019), some studies cite age, education, on and off-ramp from work—especially due to reasons such as maternity leave or women opting for half time jobs due to family care (Costa Dias et al., 2018). Other studies attribute gender pay gaps to gender stereotypes (Segovia-Pérez et al., 2020).

In contrast, Grissom et al. (2020) argue that the reason women receive less pay is due to their role choices and selection of flexible work arrangements. Meaning that women choose roles which offer lower compensations when compared to men who choose roles that offer higher pay.

A study by Usman et al. (2018) found no discrepancies in executive management pay where remuneration committees are gender diverse. Whilst other study concludes that women in executive positions do not receive equal respect and appreciation as men, the lack of respect then manifests in their pay (Ryan & Dawe, 2021). In countries such as Denmark, it was found that the introduction of legislation such as the wage bill and promotion of transparency around pay by gender assisted in the reduction of gender pay gaps (Bennedsen et al., 2019). A recent study by Meara et al. (2020) attribute gender gaps to gender exclusions and sexism.

5 Succession Planning

Succession planning is used by organisations to plan human capital resources that will ensure organisational sustainability and future successes (Ballaro & Polk, 2017). Succession planning entails developing employees, implementing talent management strategies and employees career management (Cavanaugh, 2017). In addition, it means, preparations for upcoming management or leaders in the organisations (Schepker et al., 2018). It is important that human resources departments ensure that the right people are selected as successors, they are developed and retained within the organisation for future successful organisational performance (Tao & Zhao, 2019).

Research highlights the importance of succession planning, especially in family business since women are usually prejudiced when it comes to family business succession planning (Xian et al., 2020). Considerably, gender succession is vital in countries such as South Africa, where more than 60% of companies listed on the stock exchange are family owned (Nonkwelo, 2019). Having proper succession plans in place leads to superior organisational performance, however, there is no standard model or processes in which succession planning should be implemented (LeCounte et al., 2017). The lack of standard processes in implementing succession plans may lead to the inability of organisations to retain current employees and failure to attract potential employees (Okwakpam, 2019).

Furthermore, when organisation have succession plans in positions such as CEOs, it provides positive perceptions to external stakeholders about the organisation's strategy and risk management (Bills et al., 2017). There is also a perception that individuals in succession plans are trusted to perform and carry out organisation's strategy which links positively to their performance and desire to achieve more for their organisations (Jindal & Shaikh, 2020).

Therefore, succession planning can be beneficial for individual career management and organisational performance (Umans et al., 2020). It can also be used to retain and develop women for executive management roles, as the study by Valerio (2018) claims that there is enough pool of talented women, especially in emerging markets.

6 Perceptions

Perceptions around gender roles lead to the continued gender inequality (Kray et al., 2017). It is a common perception in most societies that roles with authority and leadership are suitable for men, whilst roles with communal traits are associated with women (Ellemers, 2018).

Traditional gender roles have changed to a certain extent, however, perceptions around men being breadwinners and women being nurturers has not changed—hence some studies have come up with terms like "empowered but not equal" (Al-Bakr et al., 2017). Most women that have been empowered through educational attainments, have entered formal employments and some are entrepreneurs who provide for their families, however the negative perception about women capabilities when compared to men remains largely unchanged (Karwati et al., 2018).

Interestingly, a study by Balachandra et al. (2019) found that the gender of entrepreneurs do not influence business investment decisions by potential investors, however, investors prefer entrepreneurs who displays strength and behaviours associated with men (agentic) as opposed to women common behaviours of gentleness (communal). A study by Hentschel et al. (2019) found that gender stereotypes are adopted by both men and women, with women demonstrating self-limiting behaviours to fit in with the stereotypes. Atkinson and Windett (2019) suggest that through demonstration of competence and experience women can change gender stereotypes and perceptions.

Therefore, an understanding of the factors impeding women career progress and improving women representation in the banking sector executive management positions will assist in addressing gender inequality, encourage women to advance their careers in banking and contribute to women economic emancipation.

7 Executive Management Gender Representation Compared

Women's equal representation in executive management positions is important for the South African banking sector for various reasons. Firstly, the South African constitution states that people may not be discriminated against based on their gender. As such, gender equality is a constitutional right. Secondly, research found that gender equality and women's representation at executive management positions is good for organisations' bottom line, and it is associated with high GDP and growth (Petersson et al., 2017; Terjesen et al., 2009). Consequently, banks will benefit from bringing more women in their executive management positions and contribute to the overall growth of the country. Despite research showing that women's career progression to executive management brings alternatives to leadership skills, contributes to enhancing corporate governance and instils the culture of inclusivity (Singh & Vinnicombe, 2004), executive management levels roles of first line are still dominated by men (Catalyst, 2020).

Over the last decade, the South African labour force has made great strides in empowering women in junior and middle management positions. Notwithstanding the seemingly notable progress, the statistics on employment equity shows a situation where women in the South African banking sector are unable to rise above the senior management level positions. One of the key objectives of the South African constitution is the creation of an environment which promote gender equality. Furthermore, the Women Empowerment and Gender Equality bill prescribes 50% representation in positions of influence and authority.

The South African Employment Equity Act, as well as the Financial Services Charter have not achieved their intended objectives of a fair representation of women across levels of employment. In support of the government policies and initiatives to empower women, the South African banking sector pledged to implement the Financial Services Charter in 2004 to support transformation within the sector. The charter served as a voluntary commitment by the financial service sector to transform the economy in five pillars (ownership, employment equity, procurement and enterprise development, empowerment financing, and access to financial services). The key challenge in the banking sector is that banks have unsuccessfully accommodated women in key strategic positions in line with the Employment Equity Act, as well as the Financial Services Charter commitments.

The amended Financial Services Charter became effective in December 2017; however, it is not known whether the new charter will fast track transformation of women in executive positions, given the failed attempt of the old charter. Orr and van Meelis (2014) note that the South African labour force witnessed high levels of women employment during the period 1995 to 2005. However, they found that a large percentage of women were in low quality and low paying jobs. Further, of consideration is the potential loss of talented women by organisations which are slow in transforming and advancing women's careers, as men continue to outnumber women in executive management positions.

Similar to South Africa, countries such as India, where women were equally marginalised have adopted legislations to empower women and provide equal job opportunities during the 80 s. Research shows that women are still not equally represented in executive positions and continue to face challenges such as glass ceiling in India corporate environments (Dhariwal & Rajesh, 2020). Similarly, women in Bahrain have reported stagnation in leadership advancement as an issue in the banking sector and a cause of women career changes (Al-Alawi, 2016). The study of women in the Nigerian banking sector (Lagos), found that women do not suffer from gender discrimination, however, need to care for family as well as stern promotional practices by banks hinders women abilities to advance their careers (Orbih & Imhonopi, 2019).

The findings of the literature above suggest that globally, women face career challenges to advance to executive management positions and remain underrepresented in bank executive roles. Furthermore, there are different explanations contributing to this phenomenon ranging from personal reasons, cultural factors and organisational structures (Pia et al., 2019). South African women have suffered inequalities in the labour market for decades and most of the job assignments where not only based on gender, but were also racially segregated (Shepherd, 2008). For example, white women were typically not permitted to take-up formal employment, whereas black women were employed mainly as domestic workers or in the agricultural sector and coloured women were largely employed as factory workers.

The labour market discrimination practices improved slightly post the enactment of the South African constitution in 1994, prior to that, women suffered from, amongst others, following labour discriminatory practices (Lues, 2005):

- Restricted admission to schooling, health system and labour participations
- Primary role of caring for family
- Low-priced/salaries for their work
- No backing from laws of the country and community authorities

Even with the post 1994 improved labour reforms, politicians' priorities were mainly to eradicate racial discriminations with less focus on addressing gender inequalities (Van der Merwe, 2012). In recent years, the South African women participation in labour market has increased by over 50%, however women occupy senior managerial positions in pink collar jobs (e.g. domestic and community services) as opposed to other sectors of the economy (Jaga et al., 2018).

8 Research Method

A phenomenological qualitative research design was used to explore the lived experiences of women and to gather the perceptions of men who are in executive position regarding the continuing phenomenon of gender inequality in executive management positions.

9 Data Collection

The participant selection process followed a nonprobability sampling method that enabled the researcher to select appropriate respondents to meet the research objectives (Tansey, 2007). The sample size was 25, of which 17 were women and 8 men.

The identified sampling for this study included divisional CEOs or banking group CEO (if the bank has multiple licenses) and senior management/executives in first line business areas who resided in Gauteng, South Africa. The banks from which the sample was drawn included local banks and foreign banks operating in South Africa. The reason for the selection of the CEOs was because CEOs have a fundamental understanding of the key business functions and roles that have the greatest impact on the banks' strategies and the skills required for such roles. Furthermore, some of the CEOs' profiles reveal that they have started in the first line roles. Participants held various executive titles such as Chief Executive officer (CEO), Chief Investment Officer (CIO), Chief Operating Officer (COO), Head of business and senior manager. All the participants held more than one educational degree. Their background of study ranged from commerce/finance, accounting, mathematics, actuarial sciences, and medical field. Majority of female participants were married with kids and all male participants were married, except for only 1 who was a divorcee (single). The female participants who indicated their marital status as single, mentioned that they have kids.

Semi-structured, open-ended questions, which guaranteed participant autonomy, were used. Interviews took place at participants' preferred locations and at their convenient times. Interviews were audio recorded with participants written consent. Participants' identities were protected using unique numerical identifiers and codes, to disguise their names and the identities of the banks which employed them.

10 Data Analysis

A thematic analysis methodology of data analysis was used to analyse the information provided by the twenty-five interviewees, following Braun and Clarke's (2006) thematic analysis. Thematic analysis is a rigorous and inductive conventional process designed to identify and examine themes from textual data in a way that is transparent and trustworthy (Guest et al., 2011, p. 15). In other words, thematic analysis takes several transcriptions and classifies them into common categories and themes. Following the thematic analysis technique, after transliterating the audio interviews, the data was organised, coded, and grouped. Furthermore, for more accuracy and more depth in the data analysis, a Computer Assisted Qualitative Data Analysis Software (CAQDAS) NVivo version 12 Plus was used.

Themes were constructed, refined, and finalised. Key themes emerged from the inductive data analysis method as occupational roles women occupy upon joining the bank, barriers of entry into first line roles for women, challenges women face in their career progression to executive management positions, support systems and gender stereotypes. The findings below are presented according to these themes.

11 Findings

Results revealed findings that pertained to occupational roles, barriers, challenges, support systems and gender stereotyping are presented, as the key findings of the investigation into gender inequality in executive management positions in the South African Banking sector. These findings are presented below.

12 Occupational Roles

The study found that occupational roles was the major contributor to career progression to executive management positions within the banking sector. As such, individuals with exposure and experience in income generating areas of the bank are considered suitable for positions such as CEO and other powerful positions within executive committees.

The reason being, these individuals possess knowledge about banks products, understand customer requirements and are able to come up with the right solutions for the bank, shareholders, employees, and all stakeholders. The analysis of the data indicated that majority of the participants initial roles were in the first line business, roles such as business partner, dealer, first line graduate programmes and transacting. What was common from all participants was that you may start in roles that are not first line, but the non-first line roles have limited opportunities for progression into executive roles and often takes a longer period for an individual to ascend to the top. Responsibilities in the first line roles are perceived as having a significant positive contribution to the overall health of the banks and sustainability from the profit and loss (PNL) or Balance Sheet point of view. Some of the participants argued that it is through the first line positions that people are prepared for the senior positions in most banks. Most of the participants also highlighted that technical skills for one to excel are acquired during this period or time spent in first line business. First line areas are fast paced and a disadvantage for women who need to off ramp, for example, take maternity leave as everything progress at a rapid pace.

13 Barriers

The study highlighted the barriers of entry into first line that women encounter as: age, gender stereotypes, type of qualification, lack of sponsorships and male dominated interview panels. Some banks consider young women of childbearing age as riskier, since they are at a point in their lives where they would start their own families, and this would reflect badly on the progress of the business due to an increase in the percentage of maternity leaves. It was noted that areas within banks that are fast paced are less likely to take a chance on women perceived to be a high risk. Over and above barriers mentioned above, women continue to experience career challenges ranging from self-inferiority complex, male-dominated environments, lack of suitable role models, lack of support structures, bias in promoting women, organisational culture, discrimination, lack of sponsorships and work life balance.

14 Challenges

Self-inferior complex was highlighted as the main challenge in that women are afraid to raise their hands when executive management positions become available. This fear is more prevalent in first line management positions or vacancies. This fear emanates from the believe women have that they are not good enough and fear failure and rejection in executive management positions and first line roles. Whereas men tend to be generally a lot more confident and believe that they can succeed in everything. Women do not self-flatulate, men self-flatulate a lot, particularly white men. They generally exude confidence, they believe in their capabilities rightly or wrongly, the study found.

Work-life balance was identified as one of the biggest obstacles to women's career progression. Women find themselves facing the challenge of trying to deal with the dual responsibility of managing work and family. Participants highlighted that women working in the banking sectors are unable to fulfil their work and life demands simultaneously because of lack of flexible working opportunities. Their contribution and responsibilities extend both at work and at home. As a result, male participants can work long hours than their female counterparts. Men in executive positions have strong home support systems and women in executive positions are expected to fulfill their role as a caretaker at home. As a result, male participants can work long hours than their female counterparts. Men in executive positions have strong home support systems when compared to women in executive positions.

However, women continue to adopt coping strategies such as self-belief and competitiveness, self enhancement through education, equal participation, role modelling and dalliance. Self-belief and being competitive in the work environment were cited as the strategies mostly adopted by women in first line roles for their career advancements. Use of women's natural charm/dalliance was mentioned but did not come up as the key strategy. Confidence, enthusiastic, competitieveness were cited as a winning coping strategy for women who want to advance to executive positions. Women mentioned that they always did more than expected of them. They mentioned that they were deliberate in their ways and were aware of male dominance in positions of power, hence a need for women to aggresively position themselves and do whatever role they are given to the best of their abilities to build competence.

Being competent helps in building confidence. Having confidence is important, especially where women are not taken seriouly, confidence allow them to push and not quit until they are heard. Confidence gives women voice and the ability to sell themselves through high perfomance standards. Perfomane leads to recognition, which later assist with career advancements.

15 Support Systems

Banks have also adopted support strategies to increase the number of women in first line roles and to retain a few women that are already in first line businesses. Strategies such as gender diversity and equity practices in recruitment, graduate programmes and enhanced hiring and retention strategies have been implemented. However, all these strategies will take time to realise, unless top leadership is deliberate about implementing changes.

Support systems enables women to focus on their careers, and without adequate support the chances of success are minimal (Buckles, 2019). What senior women holding executive positions in banking mentioned as one of the key components to their career successes and progression is the need to have support structures in place. The study revealed six (6) main support systems adopted by women as a way of coping with the pressures of work and family, these are: Au Pair, support from other family members, female networking, organisational support such as availability of coaches, personal connection, and sponsorship.

16 Gender Stereotypes

The results of this study confirmed prior findings that gender roles, stereotypes and discrimination disempower women from advancing in their careers. Gender stereotypes result in women being treated sternly as leaders, therefore making it difficult for them to attain career successes (Basow, 2016). Gender stereotypes result in hiring and recruitment discriminations, especially for women who are mothers (González et al., 2019).

The findings in this study extend the knowledge in the field of management and are intended to enable management of banking organisations, human resources practitioners and career women to better understand barriers and challenges in male-dominated executive positions and business areas such as first line roles in banking. The results provided noteworthy examples and viewpoints of the participants which formed part of the study.

This study has important implications for individuals, society, and organisation. It provides a framework that recommend a holistic approach towards women empowerment. The framework recommends consideration of internal (personal) and external (organisational & societal) factors concurrently (Fig. 1).

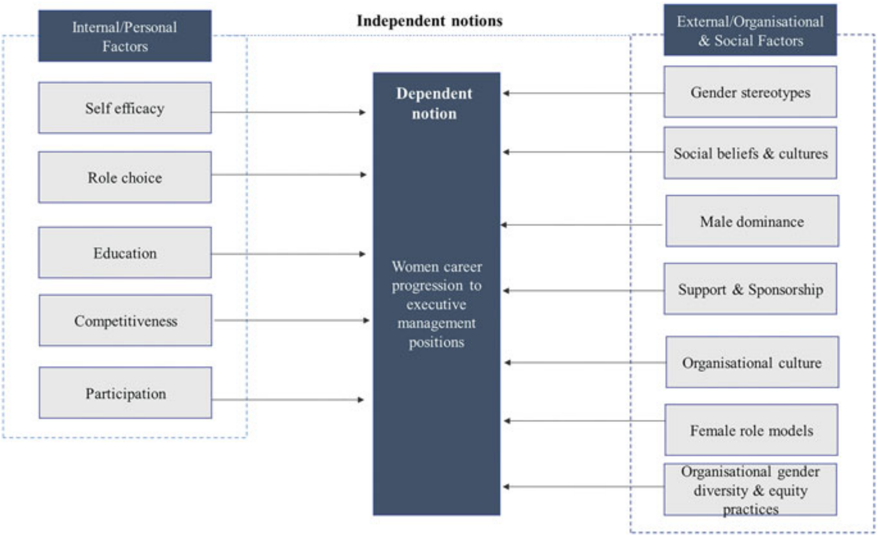

Fig. 1 Theoretical Framework—Internal and External Factors contributing to Women career progression to executive management positions

In most cases, banks strategies and policies are focused on external or organisational factors neglecting the personal and social factors which women may need support on. Adopting a silo approach may not address most issues women are faced with and fixing one aspect of a problem may neglect other significant issues women experience. Therefore, banks policies and strategies should be all encompassing.

17 Conclusion

Important observation from the study is that through awareness of the roles which offer higher chances of accelerating career growth within the banking sector, women can make better choices upon joining the bank. Additionally, challenges and barriers of entry into these roles due to work demands and women responsibilities to care for the household could be addressed through provision of flexible and agile working arrangements. Research has demonstrated that flexible working arrangements are economically feasible and lead to increased productivity where women can choose the location and availability that is suitable both for work purposes and personal roles requirements (Angelici & Profeta, 2020). Furthermore, the recent outbreak of the corona virus forced organisations and individuals to adopt flexible working ways during governments' lockdown periods. Therefore, adoption of the "Internal and External Factors contributing to Women career progression to executive management positions framework" could assist address gender transformation within the banking sector and other sectors where women are underrepresented in executive management roles.

As much as the study found that banks have implemented gender practices such as graduate programmes, training, mentorships. These initiatives have not yielded the intended results as they do not enable banks to meet gender equality at executive management levels, thus a recommendation for banks to consider both internal and external factors concurrently in their strategies as suggested by this study. Scholars can build on this framework, but also obtain insights on strategies that women could adopt early in their careers that may enable them to navigate through barriers and challenges emanating from, amongst other, gender biases, organisational cultures and women's lack of self-belief. Further exploration of initial occupational roles choices upon joining banks is needed. Further research on effectiveness of banks diversity programmes and recruitment strategies to increase women representation in executive management positions is needed.

It is worth noting the limitation of the study being geographical location of participants. Only senior executives from South African banking sector located in the Gauteng province formed part of the study. Future studies should consider the inclusion of participants from all over the world, given technological advancements where meetings could be held through secure virtual platforms.

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A Comparative Analysis of South Africa's Carbon Pricing Policy in the Power and Energy-Intensive Industries

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Abstract Carbon pricing strategies are an integral policy instrument for achieving a decarbonised economy. By increasing the price of carbon emissions to reflect the social cost and harmful effects of climate change, users are prompted to adopt sustainable energy options. This study evaluates South Africa's carbon tax regime design as an accelerant towards the decarbonisation of the energy-intensive sector. The analysis reveals that South Africa's carbon tax is ineffective in decarbonising the energy-intensive sector. Low carbon prices, excessive free emission allowances, and continued subsidy support of fossil fuels have limited the potential of South Africa's carbon tax towards shifting consumption and production away from greenhouse gas-intensive activities. A comparative tax analysis of Canada, Switzerland, and the United Kingdom's carbon pricing policies is conducted to benchmark policy lessons for South Africa. First, a review is performed of South Africa's proposed carbon pricing policy. Second, a comparative analysis is conducted on the current practice in the comparative countries. Third, policy lessons are drawn from the comparative countries to accelerate decarbonisation in South Africa's energy-intensive industries. The paper contributes to tax policy scholarship on designing a carbon pricing model for South Africa's energy-intensive sector.

Keywords Carbon pricing · Energy-intensive industry · Emissions trading scheme · Carbon budget · Carbon subsidies · Renewable energy

1 Introduction

Climate change has been declared as this century's most eminent environmental global challenge (Mikhaylov et al., 2020; Ginanjar & Mubarrok, 2020) arising from increasing levels of anthropogenic greenhouse gas (GHG) emissions from

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industrialisation and the burning of fossil fuels (Intergovernmental Panel on Climate Change, 2014). The energy intensive sector's contribution to climate change stems from the extensive use of fossil fuel-generated electricity and the release of GHG in the industrial processes (Farjana et al., 2019). The resultant increase in GHG changes the earth's climate resulting in increased occurrence of extreme weather conditions (Intergovernmental Panel on Climate Change, 2014) posing a significant threat to the business continuity of energy-intensive operations and damage to infrastructure. These adverse effects of extreme weather conditions require immediate mitigation strategies and policies to slow down the advancement of climate change.

South Africa has an energy-intensive economy with primary energy generation from fossil fuels (Mineral Resources and Energy, 2021). The industrial sector consumes approximately 50% of the energy generated in South Africa and contributes 5.6% towards the national emissions from direct business process emissions (Department of Forestry, Fisheries and the Environment, 2022; Department of Mineral Resources and Energy, 2021). This contributes significantly towards GHG emissions indirectly from fossil fuel energy consumption and directly from business processes. Substantial strides towards decarbonisation in this sector can contribute significantly towards decarbonising the country. Other countries have similarly reduced emissions and offer good practice policy lessons.

Prior studies investigated the national carbon pricing effects on GDP, revenue recycling, and effective carbon price determination (Alton et al., 2014; Garidzirai, 2020; Nong, 2020; Steenkamp, 2021; Van Heerden et al., 2016; Vorster et al., 2011; Winkler, 2017; Winkler & Marquard, 2019). These studies primarily evaluated carbon pricing aspects from a national level and do not exclusively focus on the energy intensive sector. Thus, a gap exists in the literature on designing carbon pricing policies specifically for energy-intensive industries. The contribution from this study offers recommendations for the second phase of South Africa's carbon pricing policy regime.

This paper adopts a qualitative review of carbon pricing policy regimes in comparative jurisdictions and aims to answer the research question: Is South Africa's carbon pricing regime designed to accelerate decarbonisation of the energy-intensive sector? The paper proceeds as follows: the following section reviews carbon pricing policy design principles. Second, a review is conducted of South Africa's carbon pricing system and policy impediments. Third, a review of the United Kingdom, Switzerland, and Canada's carbon pricing policy. Fourth, policy lessons are drawn from the comparative countries to accelerate decarbonisation in South Africa's energy-intensive industries.

2 Decarbonisation Environmental Policy Instruments

Environmental policy instruments have been central to the government's response to climate change mitigation (Pacheco-Vega, 2020). The policy instruments comprise regulatory, market, subsidies, and information-based instruments. Regulatory

Table 1 Market-based policy instrument design considerations

Emissions Trading Scheme	Carbon Tax
Establish an emissions cap that is set to decline yearly to illustrate departure from the business-as-usual pathway.	The carbon tax rate should be high enough to incentivise decarbonisation efforts.
Broad coverage of emission sources results in efficiency in lowering the cost of emission reductions.	Free emissions limit the effectiveness of a carbon tax.
Diverse tax base to avoid dominant taxpayers from manipulating price levels.	Revenue recycling to supplement regressive carbon tax impact.
Fixed emission cap add simplicity to the administration.	Simplifying administration and tax compliance.
A substantial portion of the emission allowances must be auctioned.	Policy measures to address carbon leakage.
Reliable monitoring and verification of emission levels.	Emissions sources will be subject to a carbon tax.

Source: Author's own compilation from OECD, 2017; Parry, 2012; Sumner et al., 2011

instruments prescribe mandatory emission levels or technology standards that must be employed to reduce emission levels (Gupta, 2020; Liao, 2018; National Treasury, 2010; Steinebach, 2022). Market-based instruments price carbon through taxes or auctions through an emissions trading scheme (Wills et al., 2022). Information-based instruments only require voluntary reporting of environmental information to governments and other stakeholders (Liao,2018). Subsidies are granted to promote energy efficiency, renewable energy adoption, and rewarding emission reduction. Command and control and market-based instruments are the two commonly used policy instruments to abate the climate change problem (Cardona et al., 2021; National Treasury, 2010; Tang, Li, Zhang, 2020a, Tang et al., 2020b), with global preference skewed towards market-based instruments (McKitrick, 2016; Steinebach et al., 2021; Wolde-Rufael & Mulat-Weldemeskel, 2021).

Market-based instruments are generally designed following the Pigouvian framework (Halkos & Kitsou, 2018; Heal & Schlenker, 2019). Pigou first proposed the use of economic incentives, to correct the unaccounted negative externalities caused by pollution (Jaqua & Schaffa, 2021; Li & Deng, 2022; Wang & Zhang, 2019). Negative externalities are omitted costs of pollution in the final cost of goods resulting in a market failure (National Treasury, 2018). Pricing carbon would correct the market failure by internalising the cost of pollution and increasing the cost of goods and services resulting in a decreased demand for goods and services. A decline in demand reduces the indirect and direct emissions from carbon-intensive industrial processes. Table 1 summaries the effective market-based policy instrument design options.

While market-based instruments are generally accepted in the market as necessary policy instruments for climate change abatement Rosenbloom et al. (2020) argue against the premise that carbon dioxide (CO_2) is a negative externality causing market failure. Rosenbloom et al. (2020) argues that climate change is a systematic problem, with technologies, regulations, and infrastructure deeply ingrained in the combustion of fossil fuels. Reducing the advancement of climate change requires systematic changes and cannot be achieved by a single driver in the form of carbon taxes. A combination of instruments are required; for instance carbon pricing and emissions cap are central to incentivising behavioural changes toward low-carbon solutions.

3 Policy Impediments to South Africa's Carbon Tax Regime

3.1 Introducing a Carbon Tax

South Africa introduced the Carbon Tax Act 15 of 2019, levying a tax at a rate of ZAR 120 per tonne of CO_2 equivalent to GHG emissions. Over the years the carbon tax rate increased to a rate of ZAR 159 (USD 10) per tonne of CO_2 equivalent in 2023 (National Treasury, 2023). The carbon tax is levied on direct emissions from fuel combustion, fugitive emissions,[1] and industrial process emissions. Entities are granted free emission allowances that vary according to the specified industry. Energy intensive sectors can get between 60% and 90% free emission allowances, resulting in an effective carbon tax rate of between ZAR 63.60 and ZAR 15.90 (USD 0.81[2]) in 2023. The carbon price is expected to increase by the rate of inflation from 2023. At an average inflation rate of 7.5%, the carbon tax rate will be ZAR 183.74 (USD 9.32) by 2025. This price is significantly lower than the recommended effective carbon price trajectory of between ZAR 788 (USD 40) and ZAR 1576 (USD 80) per tonne by 2025, and ZAR 985 (USD 50) to ZAR 1970 (USD 100) by 2030 (Stiglitz et al., 2017). It can therefore be deduced that the carbon tax will be limited in influencing any real change in behaviour toward low-carbon operations.

The capacity of the carbon tax to reduce carbon emissions is further limited by generous tax-free emission allowances, that further reduce the effective carbon tax rate. The rationale for granting free emissions allowances was an interim measure to allow entities time to transition. Van Heerden et al. (2016), recommends that for South Africa to achieve their Paris Agreement commitments by 2035 of reducing carbon emission by 52.5%, requires the cumulative removal of the free emission allowances and the recycling of carbon tax revenues through renewable energy subsidies. Subsidies reduce the effective carbon price and limit the prospects of investing in decarbonising technologies.

Renewable energy subsidies can be funded by reforming fossil fuel subsidies into renewable energy subsidies. Fossil fuel subsidies are counterproductive to the transition into a low-carbon economy (Skovgaard & Van Asselt, 2019). In 2019, South Africa subsidised the production of fossil fuels by 2.4% of the country's

[1] Unintentional emissions leaks from industrial plants and equipment.

[2] Translated at a rate of R19.70: USD 1.

revenue (International Institute for Sustainable Development, 2019). The continued support of fossil fuels contradicts the purpose of carbon pricing (Boyce, 2018; Skovgaard & Van Asselt, 2019) and further limits its ability to decarbonise operations. Transitioning to a low-carbon economy requires the carbon price to exceed the cost of decarbonising technologies (Boyce, 2018). Subsidy support and free-emission allowances need to be removed along with increased carbon prices to incentivise the energy-intensive sector to increase their decarbonisation efforts.

3.2 Proposed Changes to South Africa's Carbon Tax

The 2022 budget speech proposed the integration of mandatory carbon budgeting to the carbon tax system. Emission caps will be allocated to companies with emissions from stationary combustion, civil aviation, domestic navigation, fugitive emissions[3] and industrial processes and product use. Entities exceeding the prescribed emission caps will be levied with a higher carbon tax of ZAR 640 (USD 32) per tonne of CO_2 equivalent emissions.

The Climate Change Bill [B9–2022] legislating the mandatory carbon budgeting had not been promulgated by the intended start date of January first, 2023, and will only be effective once the public consultation is finalised and the bill is signed into law. The introduction of mandatory carbon budgeting will abolish voluntary carbon budgeting that gave entities 5% free emission allowances.

The second phase of the carbon tax system is scheduled to start on first January 2026 with signals of a higher carbon tax, reduced free-emission allowances, and removal of electricity credits to avoid electricity price increases due to carbon tax. The signals are intended to encourage entities towards decarbonising operations. However, energy-intensive entities are limited in making an investment decision towards adopting decarbonising technologies without an estimate of the financial implications of a carbon tax. The Mineral Council of South Africa representing the energy-intensive mining sector has expressed concerns regarding the uncertainty surrounding the future trajectory of the implementation of a carbon tax in South Africa. Carbon tax increases the cost of producing resources that adversely affect the competitiveness of energy-intensive entities. The increased selling price of goods results in reduced demand for goods. Some energy-intensive entities have regulated prices and increased production costs from carbon tax reduce their profitability. Policy certainty can aid energy-intensive entities to make optimum investment decisions.

Policy uncertainty, low carbon prices, excessive free emission allowances, and continued fossil fuel subsidies have limited the potential of South Africa's carbon tax towards shifting consumption and production away from greenhouse gas-intensive activities.

[3] Unintentional emissions leaks from industrial plant or equipment.

4 Comparative Analysis

4.1 Rationale for the Selection of Comparative Jurisdictions

The United Kingdom, Switzerland, and Canada have a carbon pricing policy mix of an emissions cap, carbon tax, or carbon subsidies to encourage decarbonisation of energy-intensive sectors. South Africa intends to integrate an emissions cap into the existing carbon tax and can draw policy mix design lessons from the United Kingdom, Switzerland, and Canada. Benchmarking best practice policies that accelerate decarbonisation of direct and indirect emissions from the energy-intensive sectors will significantly contribute towards the decarbonisation efforts required to reach nationally determined emission reduction targets.

4.2 The United Kingdom Carbon Pricing Policy

The United Kingdom introduced the United Kingdom Emissions Trading Scheme in 2021 after withdrawing its participation in European Union Emissions Trading Scheme in December 2020. Energy-intensive industries and power-generating entities with a thermal[4] input exceeding 20 megawatts must comply with the United Kingdom Emissions Trading Scheme (Barnes, 2021; Richardson-Barlow et al., 2022). Emission credits are both auctioned and allocated freely to some industries (Abdul-Salam et al., 2022). Free emission allowances are allocated to entities with a risk of carbon leakage and adverse effects on competitiveness (Richardson-Barlow et al., 2022; Abdul-Salam et al., 2022). Auctioned emission allowances first retailed for GBP44 (ZAR 1056)[5] per tonne of CO_2 in 2021 (Richardson-Barlow et al., 2022) and increased to GBP 83.03 (ZAR 1993) in 2023. This significant price increase may be a signal for entities to find more cost-effective solutions towards decarbonising operations.

Additional policy measures targeted at heavy polluters advanced decarbonisation efforts in the United Kingdom. A carbon price support levy (CPS) was added to emission trading scheme (ETS) prices of the power sector. The CPS was a supplementary measure to accelerate decarbonisation in the power generation sector amid perceived ineffective carbon prices (Abrell et al., 2022; Gugler et al., 2023; Leroutier, 2022; Richardson-Barlow et al., 2022). The CPS was GBP 5 (ZAR 120) per tonne of CO_2 in 2013 and has remained GBP 17 (ZAR 408) per CO_2 since 2017 (Leroutier, 2022).

The introduction of the CSP has been very instrumental in decarbonising the United Kingdom's power sector (Leroutier, 2022; Richardson-Barlow et al., 2022). Electricity generation from coal declined from 40% to 7% and electricity generation

[4]The rate at which fuel can be burnt.

[5]Translated 1GBP: 24ZAR.

GHG emissions declined by 57%. (Leroutier, 2022). These measures were aimed at the power sector; however, these findings can be extrapolated to advance decarbonisation efforts in energy intensive sectors.

The United Kingdom also imposes a climate change levy on non-domestic users of electricity, gas, and solid fuels (Barnes, 2021). The rates for electricity and gas are GBP 0.00775 (ZAR 0.186) and GBP 0.00672 (0.161) per kilowatt hour. Energy-intensive entities with government-approved pledges to reduce energy use pay a reduced climate change levy. The discount rates range between 77% to 92% depending on the fossil fuel used to generate electricity (HM Revenue & Customs, 2022). The discounts are substantial for energy intensive business processes and may incentivise participation in energy efficiency measures and renewable energy adoption.

4.3 Switzerland Carbon Pricing Policy

Switzerland has three climate policy instruments to regulate decarbonisation in the country. The policy instruments comprise a CO_2 levy, emissions trading system, command, and control instrument that reward medium-sized entities with a subsidy for emitting below the threshold (Hintermann & Žarković, 2021).

4.3.1 Carbon Levy

A carbon tax on the production, extraction, and importation of thermal fuels was introduced in 2008. Thermal fuels are fossil fuels used in thermal facilities or combined heat and power plants to produce heat, light, and electricity. Coal, natural gas, oil, diesel, and biomass are commonly used thermal fuels in thermal facilities to produce heat, light, and electricity. The carbon tax levied on thermal fuels is CHF 120 (ZAR 2575) per tonne of CO_2 in the year 2022 (The Federal Council, 2021b). The carbon levy is intended to encourage reduced use of fossil energies and accelerate conversion to green energies (The Federal Council, 2021a). The transition to green energies can be achieved by making the use of fossil fuels more expensive than green energy sources.

4.3.2 Switzerland Emissions Trading Scheme

The Switzerland Emissions Trading Scheme was introduced in 2008 with a voluntary 5-year participation period (The Federal Council, 2011). Post the voluntary participation period, GHG-intensive entities with a combustion capacity exceeding 20 megawatts must participate in the Swiss Emissions Trading Scheme. Entities with lower combustion levels can opt to voluntarily participate in the Swiss Emissions Trading Scheme (Galdi et al., 2020; Hintermann & Žarković, 2021). Entities participating in the Switzerland Emissions Trading Scheme are exempt from paying the carbon levy. Like all other ETS programs some emission allowances are granted for free and some auction among ETS participants.

The auction price per tonne of CO_2 was EUR 86 (ZAR1 720[6]) in March 2023. Industries at risk of carbon leakage receive all their allocated emissions as free emission allowances. Other industrial entities received 30% of the sector allocation as free emission allowances that will decline to 0% in 2026. No free emission allowances are granted to the power sector. These free emission allocations are in line with the European Union Emissions Trading Scheme to allow for a seamless link between the two emissions trading systems. Participants can use allowances from the European Union Emissions Trading Scheme in the Switzerland Emissions Trading Scheme and vice versa (Verde & Borghesi, 2022).

4.3.3 Command and Control with Subsidy

Entities that will have their competitiveness adversely affected by the imposition of a carbon levy may be exempt from paying the CO_2 levy (Hintermann & Žarković, 2021:292; The Federal Council, 2021b). The exemption is subject to these entities pledging to the Swiss Confederation an emissions reduction plan (The Federal Council, 2021b). Approved reduction target emissions trading schemes are formalised through an entity's carbon budget (Hintermann & Žarković, 2021). Emission reduction measures must be economically feasible and implementation costs recovered within 4 years to be considered for approval (Hintermann & Žarković, 2021; The Federal Council;, 2021a). The period is extended to 8 years for the real estate industry (The Federal Council, 2021a). A penalty of CHF 125 (ZAR 2683[7]) is levied per tonne of CO_2 equivalent that exceeds reduction obligation emissions (The Federal Council, 2011). Where entities exceed the reduction plan target emissions the surplus emissions reduced can be sold for CHF 100 (ZAR 2146) per tonne of CO_2 equivalent (Hintermann & Žarković, 2021). It was found that entities subject to emission reduction regulations had greater emission reduction measures than entities paying a carbon levy, with a reduction in emission levels of 11.7% between the years 2012 and 2018 (Hintermann & Žarković, 2021). These results should however be interpreted with caution as some of the emission reductions were likely to occur in the ordinary course of operation (Hintermann & Žarković, 2021).

[6] Translated 1EUR: 20ZAR.

[7] Translated 1CHF: 21.46ZAR

4.4 Canada Federal Carbon Pricing Policy

In 2019 Canada introduced a national carbon tax system for territories that did not implement a carbon pricing system, or whose carbon pricing policies fell short of the national carbon tax requirements (Gilder & Stiles, 2019; Kiss & Popovics, 2021; Lin & Bui, 2019). The introduction of a national carbon tax policy was in recognition of the challenge of meeting their nationally determined contributions target emissions trading scheme without participation from all the territories in Canada (Gilder & Stiles, 2019; Lin & Bui, 2019). The introduction of the national carbon pricing system was met with criticism over the validity of the federal government imposing such a tax (Lin & Bui, 2019). Provincial and federal governments have power over the environment and taxation; however, provinces own the natural resources and regulate their use within their borders whereas the federal government regulates cross-province and international movement of goods (Criqui et al., 2019). This creates an overlap of juristic powers on who has the environmental taxing rights.

After numerous legal battles, the compromise reached was to suspend national carbon if the provinces implemented their own systems. The carbon policies would need to be sufficient to reduce the provinces' proportional share of carbon emissions to be exempt from applying the federal carbon tax systems (Gilder & Stiles, 2019). Carbon pricing is the key strategy to achieve the federal government's plan to reduce GHG emissions by 30% below 2005 levels (Lin & Bui, 2019). The introductory federal carbon tax on fossil fuels was CAD10 (ZAR145) per tonne of CO_2 in 2019 (Environment and Climate Change Canada, 2017; Geroe, 2019; Gilder & Stiles, 2019). The carbon tax trajectory was to raise the carbon price to CAD50 (ZAR 726) per tonne of CO_2 in 2022 (Geroe, 2019; Environment and Climate Change Canada, 2017; Gilder & Stiles, 2019). The current price in 2023 is CAD 65 (ZAR 945)[8] set to increase by CAD 15 (ZAR 218) per year till 2030 to reach a CAD 170 (ZAR 2470) price.

The federal carbon pricing system is referred to as the backstop carbon levy (Geroe, 2019; Lin & Bui, 2019). The backstop has two aspects a point-of-sale carbon levy on fossil fuels used and an output-based pricing system for industries that emit above the prescribed threshold (Environment and Climate Change Canada, 2017; Geroe, 2019; Gilder & Stiles, 2019). A carbon levy is imposed on all fuels used in a jurisdiction (Environment and Climate Change Canada, 2017). The following fuels are exempt from the backstop carbon levy (Environment and Climate Change Canada, 2017):

(a) Fuel used at a facility whose emissions are accounted for under the output-based pricing system,
(b) gasoline and diesel fuel used by registered farmers in certain farming activities,
(c) fuel exported or removed from a backstop jurisdiction,
(d) fuel used as international ships' stores, and in certain circumstances,

[8]Translated 1CAD: ZAR 14.53

(e) fuel used in the manufacturing and petrochemical process in a manner that does not release heat.

The output-based standard aspect prescribes the emissions intensity for products and operational activities (Environment and Climate Change Canada, 2017). The output-based system is mandatory for industrial facilities emitting equal to or more than 50 kilo tonnes (kt) of CO_2 equivalent per year (Environment and Climate Change Canada, 2017). The prescribed emission limits are determined based on the top-performing entity's carbon intensity on products manufactured or business activities undertaken (Environment and Climate Change Canada, 2017). Emitting below the prescribed limits grants entities a credit that can be used to offset future carbon emissions. Emitting above the limits attracts the carbon federal levy net of any offset credits of an entity (Environment and Climate Change Canada, 2017). The carbon tax acts as a price ceiling backstop mechanism (Geroe, 2019). In the first year of introduction, Canada's total GHG emissions were reduced by 8.9% from 738 to 672 mega tonnes of CO_2 emissions equivalent (Environment and Climate Change Canada, 2022). Emissions from the energy-intensive sector reduced from 77.4 to 71.8 megatons of CO_2. Before the federal carbon tax, the energy-intensive sector emissions only reduce by 0.3 megatons of CO_2 between 2015 and 2018.

5 Policy Lessons and Recommendations

5.1 Capping Emissions

The overarching lesson is that emissions must be capped in heavily polluting and energy-intensive industries. Capping emissions brings about a control element of the emission levels of a country or industry. There are varied methods to establish the cap on emissions with Canada basing it on the top performer in each product or activity category, while Switzerland and the United Kingdom base the allocation on product-determined benchmarks. The method to base emissions limits on the top performer per category creates a bias towards other entities as they may not have similar resources and technologies to perform at that prescribed level. Product benchmarks assume entities producing similar products have the same business models, technologies, and intensity levels. This model also favours entities with carbon-efficient business processes, while placing a fiscal burden on less carbon-efficient businesses to catch up to the benchmark standard.

Fixed percentage and mitigation potential are other carbon budgeting emissions cap methods that can be considered in South Africa. Mitigation potential benchmarks consider the ability of the business process to be decarbonised (Department of Forestry, Fisheries and the Environment, 2021). The drawback of this method is that it places unequal decarbonisation responsibilities on entities or industries that have the higher decarbonisation ability. Fixed percentage emission allocations are more desirable as they consider the size and emission levels of each entity. Entities would be allocated a share of emissions based on the mitigation plan. Bias is eliminated as each entity would have to reduce their emission levels by 20%. The drawback to this method is that it may not promote exceeding the required emission reduction levels, without further policy incentives.

The allowable emission targets for each sector or entity must reduce every year to ensure yearly to ensure compliance with the mitigation trajectory of South Africa. An emissions cap can be achieved through a carbon budget and tax policy mix or emissions trading scheme. An emissions trading scheme is not feasible in South Africa due to the dominance vesting in a few participants. Their dominance would unduly influence the effectiveness of carbon prices. An emissions cap and carbon tax are more feasible in South Africa as the policymakers can set the price levels that would incentivise decarbonisation. The emissions caps should be based on a fixed percentage method to ensure taxpayer neutrality. Administratively this mechanism can be integrated with ease into current emissions reporting and tax authority systems.

5.2 Carbon Price

Carbon prices in the United Kingdom, Switzerland, and Canada exceed ZAR 900 which is significantly higher than the ZAR 159 carbon price in South Africa. These prices are more in line with the estimated carbon price range of ZAR 800 to ZAR 1600 per tonne of CO_2 equivalent needed in 2020 for countries to achieve Paris Agreement targets (OECD, 2021). The price trajectory should reach ZAR 1000 to ZAR 2000 per tonne of CO_2 by 2030 (OECD, 2021). Low carbon tax rates that are further reduced by excessive free emission allowances limit the effectiveness of carbon pricing policies (Baranzini et al., 2017; Boyce, 2018; Haites, 2018; Skovgaard & Van Asselt, 2019; Rosenbloom et al., 2020). Commentators to the second draft Carbon Tax Bill argued that the introductory carbon tax rate of ZAR 120 was insufficient and ineffective to persuade entities in reducing emission levels (Nong, 2020). Furthermore Nong (2020), advises that the South African carbon price of ZAR 120 would only result in emission reduction levels of 12.25% to 15.6% which is below Paris Agreement targets. Investment in decarbonising technologies occurs when the cost of carbon is higher than the cost of investments (Gong & Li, 2016). Low carbon prices have a limited impact on the country's emission levels, economy, and economic transformation. South Africa would need to increase carbon prices and abolish generous free emission allowances to accelerate decarbonisation to price levels estimated to reach Paris Agreement targets.

5.3 Policy Certainty

Tax policy certainty is crucial for investment decisions (Hanlon & Heitzman, 2010). Fiscal policy uncertainty significantly impacts the operational and investment decisions of businesses (Wen et al., 2022). Policy uncertainty over the implications of the second phase of the South African carbon tax, creates obstacles for mining investment planning that is usually evaluated over a multi-decade period (Baker, 2022). The timing and the amounts can directly impact whether entities invest in decarbonising technologies (Hanlon & Heitzman, 2010). Entities act conservatively by delaying investments during times of high uncertainty (Al-Thaqeb & Algharabali, 2019).

The comparative countries communicate emission targets and limit the trajectory to 5 years in advance. The longer-term view of the policy trajectory results in efficient decision-making, rather than delaying decarbonising technology investment in periods of policy uncertainty. The lesson for South Africa is to communicate policy direction at least 5 years in advance to allow energy-intensive entities to conduct cost-benefit analysis for investment decisions.

5.4 Decarbonisation Policy Instrument Mix

Decarbonisation in some industries may require a policy instrument mix to accelerate decarbonisation in high-pollution sectors. The United Kingdom successfully added a carbon levy on the ETS price for the power sector to accelerate decarbonisation. The increased price of carbon from the carbon levy was instrumental in accelerating the United Kingdom's power sector. Switzerland has three policy instruments to decarbonise the country in recognition that taxpayers are incentivised by different mechanisms. This resulted in entities subject to emission reduction regulations having greater emission reduction entities paying a carbon price. The feasibility of the policy option of integrating an agreed-upon emission reduction in exchange for exclusion from the carbon tax requires further research for consideration in South Africa.

A suitable benchmark for South Africa is to consider introducing a carbon levy for the non-domestic use of electricity. The increased costs of electricity would encourage energy-intensive entities to invest in energy-efficient technologies or integrate renewable energy into their operations. Phase two[9] of the South Africa carbon tax may consider the removal of the subsidy for electricity in efforts to prevent electricity price increases from a carbon tax. This will increase the overall electricity prices adversely impacting domestic users. Levying a carbon levy on non-domestic use is more appropriate as it targets the energy intensive sectors. The integration of renewable energy in energy-intensive operations will result in a triple

[9] Phase 2 starts on first January 2026.

Table 2 Summary of carbon pricing policies in comparative countries

	South Africa	Canada	Switzerland	The United Kingdom
Decarbonisation policy instrument mix	• Carbon tax	• Carbon tax • Emissions cap	• Emissions trading scheme. • Emissions cap and subsidy	• Emissions trading scheme. • Carbon tax
Carbon price	ZAR 159	ZAR 945	ZAR 1720	ZAR 1993 ZAR 2401[a] (Power sector)
Weaknesses identified in South Africa's carbon pricing policy contrasted with approach of comparative jurisdictions approach towards the functions of the tax.	• Low carbon price • Generous free emission allowances • Fossil fuel subsidies	• Emissions cap and higher carbon prices to encourage decarbonisation	• Emissions cap with higher carbon prices for exceeding emissions cap • Carbon subsidies to reward emissions below emissions cap	• Emissions cap and industry-specific higher rates for auction emission allowances. • Carbon tax on non-domestic use of electricity

Source: Authors' own compilation based on 2023 carbon prices (data sourced from sect. 4)
[a]Emissions Trading Auction price ZAR 1993 plus CPS ZAR 408.

dividend; reduced reliance on Eskom[10] will improve the security of the electricity supply, reduce electricity costs, and reduce scope two emissions.[11] Table 2 below provides a review of the carbon pricing policies in the comparative countries.

6 Conclusion and Recommendations

Policies aimed at decarbonising the energy intensive sectors need to address the direct process emissions and indirect emissions of substantial energy consumption in operations. Capping emissions is a necessary decarbonisation measure to control direct emission levels. Emissions caps need to be based on a fixed percentage method to ensure neutrality on the required decarbonisation measures across taxpayers. Exceeding the cap should be penalised due to the unsuitability of the emissions trading scheme in South Africa. It is recommended that the penalty must be charged at a higher cost than the cost of investing in green technologies. The proposed R 640 carbon penalty is below the R 800 to R1 600 carbon price necessary to ensure the attainment of emission reduction pledges. Carbon price modelling would be necessary to determine a carbon price above the cost of green technologies that can be integrated for the energy intensive sector. Excessive free emission allowances and fossil fuel subsidies need to be removed from the carbon pricing policy in South Africa.

[10] South African public entity tasked with electricity generation.

[11] Scope two emissions are indirect emissions from the use of fossil fuel-generated electricity.

Capping emissions addressed direct emissions, further policy measures need to encourage energy efficiency and renewable energy adoption. Levying a carbon levy on non-domestic use of electricity targets indirect emissions from fossil fuel electricity usage. This levy would reduce energy-intensive scope 2 emissions and coupled with unreliable power supply in South Africa should encourage energy efficiency and renewable energy adoption. Negotiated decarbonisation measures have worked better than levying a carbon tax in Switzerland. Further investigation is required for the South African context on the incorporation of agreed-upon decarbonisation measures in exchange for the exclusion of a carbon levy.

Policy certainty is imperative for green technology investments. Energy-intensive industries should receive timeous policy communication to evaluate the least cost mitigation options. South Africa needs to communicate policy direction at least 5 years in advance to allow energy-intensive entities to conduct optimal investment decisions. Policy uncertainty delays green technology investment decisions and ultimately delays the decarbonisation trajectory.

Further research needs to be conducted in modelling an effective carbon price that will subsidise the transition to low carbon operations for different sectors of the economy. Furthermore, research needs to investigate if carbon subsidies will encourage energy efficiency and renewable energy adoption in South Africa.

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Tax Policy Considerations for a Robot Tax in South Africa

Mhlanguli Nare

Abstract Enhancements in automation brings with it several benefits to workplace efficiencies but also places funding risks to the fiscus. This has potential for creating fiscal shortfall as payroll taxes decrease, thus a need to protect the erosion of the tax base. Should this labour displacement exponentially increase and is left uncurbed, it has potential for negative societal effects for the displaced workers and society at large. Balancing the benefits of automation with the potential revenue implications poses a challenge for policymakers. Addressing the taxation of robots in South Africa requires a comprehensive understanding of the economic, social, and technological dynamics at play. This desktop literature review qualitative study applies the principles of the Theory of Optimal Taxation and Laffer Curve Theory to explore the option of a tax on robots. The study concludes that current tax legislation favours automation (capital tax) as compared to human labour tax (payroll tax) and a change in policy to achieve tax neutrality between the two is imperative to avoid arbitrary. The article suggests a range of mechanisms and associated fiscal policy reforms that can be inextricably adopted.

Keywords Automation · Human labour · Policy reform · Robots · Tax

1 Introduction

The advent of Fourth Industrial Revolution (4IR) has inadvertently led to substantially expedited 'gale of creative destruction' (Schumpeter, 1942). As automation exponentially increases, so has an increase in the number of jobs shed as robots replace human labour, a phenomenon termed the 'displacement effect' (Arndt & Kappner, 2019). Mazur (2019) cites a BBC article that estimates that about 800 million jobs will be lost by 2030 due to automation. This risk is higher in developing

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countries (World Bank, 2016). Research dialogue and discourse has started on the effects of automation and possible introduction of tax (Blix, 2017; Guerreiro et al., 2022; Marwala, 2018; Oberson, 2017). In South Africa, for the 2021/2022 tax year, Personal Income Tax (PIT) contributed the most of all tax types at 35.5% of the total tax revenue (SARS Tax Statistics, n.d.). A significant portion of the tax revenue from PIT could be lost if automation rapidly expands in a developing country like South Africa with a very high unskilled labour force causing a skewed structural shift. Arguably, government efficacy in providing its citizens with public goods and services would be compromised for three reasons. The first is that there will be less revenue from taxes due to a decrease in PIT collected and the second one is that this will result in an increased unemployment rate and with that comes more demand for public goods and services and social grants.

The third reason is that low-skilled workers displaced by robotics will have to be retrained and upskilled in new jobs which itself is a costly exercise that is dependent on whether there is a positive correlation between increase in automation and boost in economic growth. Currently there is no evidence of existence of such. Large scale retrenchments could be inevitable in a developing country like South Africa. A total of 35% of existing jobs (about 3.5 m) are estimated to be at risk due to automation (Accenture, 2018). This has a direct impact on the tax revenues raised from payroll taxes by tax authorities globally. It is therefore imperative to explore mechanisms that are potentially at the disposal of fiscal policy makers to introduce robot tax that is efficient, just, and optimal to minimise the effect of labour displacement, without stifling innovation.

Most studies (Acemoglu et al., 2020; Dixon et al., 2021; Shome, 2022) investigate the introduction of robot tax from a developed countries' perspective as they relate to France, Canada and Korea, Canada, The European Union, the United Kingdom & The United States respectively. This study examines the fiscal policy reforms that are imperative to introduce robot tax in a developing economy. Thus, a gap exists in the literature linking job displacements to robot tax from the lens of an emerging economy. This paper adopts an in-depth qualitative literature review on the possibility of a robot tax, Thereafter, the study then extends this analysis to the South Africa context.

The paper proceeds as follows: the following section provides the research problem as the rationale for this research leading to a research objective. Secondly, the literature review on the regional and international context of robot tax is considered. Thirdly, the methodology and methods used in the study are spelt out. The section is followed by the findings of the research and lastly the conclusion and recommendations of the study are submitted.

2 Research Problem

Mady Delvaux, chairperson of the working group on Robotics and AI at the Parliament of the European Parliament (European Parliament, 2016), and later Bill Gates proposed a tax on robots in 2017 to slow down the rate automation which is a

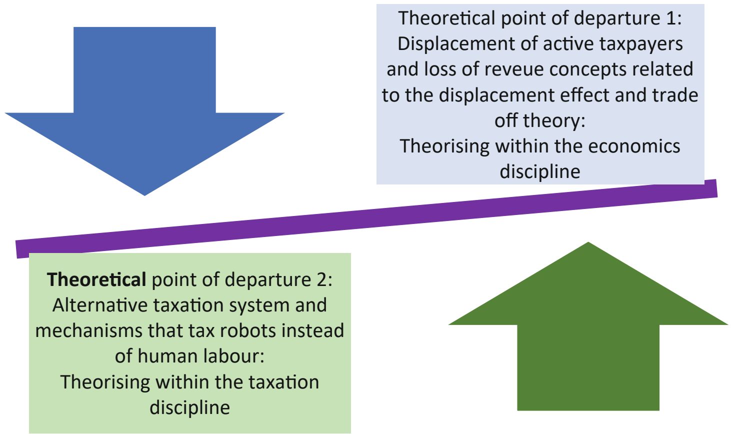

Fig. 1 Theoretical framework illustration. Source: Author

potential threat to the existence of human workforce and related taxes raised from taxing wages. Abbott and Bogenschneider (2018a) remark, "Tax policies are designed to tax labour rather than capital. It creates unintended consequences when the labour is itself capital in the form of machines." Marwala (2018) probes "what changes can be done to bring into effect the tax on robots in addition to Value added Tax (VAT)?". As our lives evolve and improve, so should our taxes. Figure 1 below illustrates the theoretical underpinning of the study.

The field related to the displacement effect and the field of optimising tax revenue from robots and have not been sufficiently explored in the case of South Africa or emerging economies. These two fields need to be brought into conjunction. This study will close this theoretical gap as the valued-adding contribution to the body of knowledge.

3 Research Objective

The article explores the possibility of establishing a tax personality of a robot from a South African legislative viewpoint and ability to pay tax in relation to the fiscal ecosystem including the Income Tax Act 58 of 1962 (ITA). The paper will look at the pertinent issues and intricacies around fiscal policy reform considerations that need to be taken into cognisance relating to implementation of a robot tax. To achieve its objectives, the research answers the following questions (**RQs**):

RQ1: What are the different mechanisms that can be adopted for the optimal taxation of robots in the South African context?

RQ2: What are the legislative changes that should be introduced to cater for each of these different mechanisms? \cr This is grounded on the premise that for introduction of any new taxes or adjustments to current taxes, tax laws need to be amended accordingly.

4 Review of Literature

4.1 What Is (Is Not) a Robot?

An antecedent to the taxation of robots discourse is probing the vexed question of 'what is a robot'? It is a fuzzy concept. Absolute certainty of what is being referred to must be sought. The potential of a perilous situation created by a vague definition is that it could create some tax evasion loophole opportunities for taxpayers leading to long and costly legal battles. It could also discourage investment as tax authorities could classify anything as a robot to maximise revenues. It could create an administrative burden and an overhaul of a multitude of some of the sections of the ITA, Tax Administration Act (TAA) and Capital Gains Tax (CGT) amongst others.

Marwala (2018) differentiates between a simple robot like a vending machine that accepts money and dispenses a product, and an intelligent one that has artificial intelligence to assist it to make good decisions. Oberson (2017) citing Bensoussan and Bensoussan, propagate that a robot goes beyond automation only but also has capacity and ability to make decisions and aptitude to learn. It is noted that taxing anything that is automated would defeat the purpose of a robot tax. A robot's ability to think and learn makes it a perfect substitute for human labour and its ability to displace humans in the production chain. It is the humanoid element that distinguishes a normal machine from an AI robot.

The definition is not clear cut though and is in contestation. Nevejans (2017) listed the following conditions of a robot: 'is a physical machine, is alimented by energy, has a capacity to act in the real world, can analyse the environment, can render decisions, and can learn'. "Perhaps the distinction lies in the fact that old-school mechanical systems—which still require dexterous human supervisors (especially on the maintenance front)—don't threaten salaried workers to the same degree robots do and thus don't expose the inequity of the current mechanised capitalist system quite as glaringly" (Kaminska, 2017). Many suggestions have been put forward with definitions and characteristics close to each other. The guidelines to defining a robot from the EU Report general guidelines (European Parliament, 2016) on developing robots and AI for civil use identifies the following main characteristics of a smart robot, and is the one borrowed for this study:

> the acquisition of autonomy through sensors and/or by exchanging data with its environment (inter-connectivity) and the trading and analysis of those data; self-learning from experience and by interaction (optional criterion); at least a minor physical support; the adaptation of its behaviour and actions to the environment; and the absence of life in the biological sense.

4.2 Robots Vs Human Labour

The use of robots has its own merits and demerits and businesspeople, researchers, policy makers, technological developers, IT specialists, engineers, economic writers, and others are not in agreement. People on the 'pro-tax on robot' side of the spectrum are conservative in preference of more labour-intensive industrial systems, have divergent views from those that are pro-automation and advocate for the increased use of robots. It is not the purpose of this article to compare the use of robots versus humans and propose which one is better overall. According to Kaminska (2017) one should compare the total costs of employing capital (that also requires fuel, maintenance, and machinery supervision costs) against the cost of employing humans (that also requires to cover food, healthcare, and supervisor costs. It can therefore be deduced that if the cost of employing capital is higher, it is not worth an investment unless operating costs are covered by the additional output.

Comparisons drawn between using robots versus human labour point out that some of the advantages of using robots is that they are cheaper as only an initial investment outlay could be needed (Statt, 2016) although Kaminska (2017) contends and asserts robots need downtime, recharge, and maintenance time just as much as humans do.

Robots can sometimes do things humans can do more effectively and efficiently. They therefore bring efficiency and savings in various sectors (European Parliament, 2016). Robots can work faster than human beings and have a lower margin of error, bringing intelligence to production (Marwala & Xing, 2018). Using latest technologies in the South African automotive industry would increase output from 610 00 vehicles to 800,000 in 2023 (TimesLive, 2019). Other studies (Bessen, 2017; Koch et al., 2021; Acemoglu et al., 2020; Dixon et al., 2021) have corroborated on this viewpoint.

"Robots are more adept at crunching complex sums and performing calculations, quicker at digesting massive datasets, can take risks humans can't (due to a lack of consciousness) and can be designed for task-specific purposes (strength, assembly, dexterity, calculation)" Kaminska (2017). There are advantages to automation besides efficiency, such as anthropological view that taxes from robots can be used to fund social goods and services.

Amongst some of the disadvantages pointed out use of robots versus human labour is illuminated by Marwala (2018) by stating that the drive towards intelligent automation will aggravate inequality. The social consequence of intelligent robots is extensive (Xing & Marwala, 2018). In South Africa, it is mostly the poor, unskilled labourers who are likely to be dispensed and the cost and process of redeploying them to more technologically advanced tasks could be high. It is suggested an earmarked (global) education tax can be used to reskill and retrain the displaced workers to assist them into transitioning into their new roles (Chand et al., 2020).

Robots require far more energy to perform the same range of tasks that humans do, and they are not self-powering leaving that responsibility to the owners (Kaminska, 2017). In addition, increase in energy consumption due to electricity production problems could exacerbate the energy crisis in a country like South Africa. More to that, robots are manufactured while humans reproduce organically (Kaminska, 2017), and it is easier to replace or redeploy human labour than a robot in case of breakdown or emergency. Further, robots also have a shorter lifespan and a higher risk of obsolescence.

4.3 Rationale of Taxing Robots (a South African Example)

The recommendations by the European Parliament (2016) were rebuffed by the EU Parliament but after endorsement and accentuation by Bill Gates, the debate gained momentum. Little research has been done in South Africa and other developing countries on the intricacies of a robot tax.

Arndt and Kappner (2019) accentuate that from a utilitarian perspective, it is ideal to tax robots as taxing humans may 'reduce his utility as bearer of utils, ceteris paribus'. They argue that AI has no utils and taxing robots will not reduce the utility of AI. In addition, by taxing humans, you hit a being with a conscious and dignity, whereas AI has neither conscious nor dignity.

In as far as the financial impact is concerned, Abbott and Bogenschneider (2018b) contend that the availability of allowances like wear and tear and accelerated depreciation for equipment and no corresponding deduction for human labour cost, financially benefits automated firms. In South Africa, if machinery owned or purchased under an 'instalment credit agreement' is used in a process of manufacture, it qualifies for Section 12C (if new) accelerated depreciation at 40% and 20% for the next 3 years or 20% per year for 5 years (if second hand). If the business qualifies as a small business corporation it can qualify for a 100% deduction in year of purchase or 50%,30, 20% deduction. If it is not used in a process of manufacture, a deduction can be claimed under section 11(e) of the ITA in terms of the Binding General Rulings No. 7 write-off periods. In contrast, wages and are deductible under Section 11(a), the general deduction formula for all expenses and losses actually incurred in production of income provided they are not capital in nature, read together with limitations in Section 23 as well as Section 11(l) for pension/provident or retirement contributions by employers on behalf of employees. It is submitted that any costs involved in operating a robot are also deductible under Section 11(a) if they meet the requirements as laid out before. It is conceded that this gives robots an advantage over human labour in that both the capital outlay and operation costs enjoy deductions under the current different Sections of the ITA.

As an illustration to the above provisions into perspective, the example assumes a firm is either 100% automated or 100% labour intensive and 'ceteris paribus", implying the effects of other taxes like the Capital Gains Tax (CGT) is excluded from this example. In practice there could be likely be a mix, though one may be dominant than the other. Assuming company X (not a small business corporation) acquires a new robot for R2million (Value Added Tax excluded) to be used in 'process of manufacture' as approved by South African Revenue Service (SARS) and incurs costs of operating and maintaining the robot of R200 000 per annum, it would claim (40% × R2m) R800 000 Section 12C allowance plus R200 000 deduction under Section 11(a), the general deduction formula, for first year of assessment. This amounts to a tax saving of (27% × R1m: after 31 March 2023) R270 000 for that year. In contrast if Company Y, non-automated, incurred labour costs of R400 000 per annum, it would deduct this under section 11(a) and would reduce taxable income equating to a tax saving of (27% × R400 000) R108 000. Company X has saved (R270 000-R108 000) R162 000 more in tax than Company Y, which is labour intensive. This is the tax saved as a result of automation. Though the gap could reduce in years 2-4 when the allowance reduces to 20%, it is still an erosion on the tax revenues. Due to technological obsolescence, the firm might have to replace the robot after year 4 or so and replace it with a new one and hence the tax savings on wages deducted never catches up. It must also be borne in mind that the R400 000 wages paid in the year is taxed in the hands of the workers as their 'gross income'.

As can be seen from the above example, robots qualify for deductions under an array of sections in the ITA, namely Section 11 or 12 (as discussed above) as wear and tear or capital allowances. Payments for human labour is only deducted at the earlier of accrual or payment under provisions of Section 11(a) and related sections like Section 11(l) of the ITA over lifespan of the firm's operation or employ of the labour. "This structure allows firms to generate a significant financial benefit from claiming significant tax deductions sooner for robots" Abbott and Bogenschneider (2018a). The tax on robots will address such an anomaly. Robot tax will raise the cost of robots and attempt to level the playing fields and additional revenue to support displaced workers (Mazur, 2019, p. 280).

Would taxing robots reduce inequality? Mazur (2019) believes that as low skilled workers are displaced, the increase in high skilled jobs will increase income disparity. Some researchers (Guerreiro et al., 2022) are of the opinion that taxing robots would make the income tax more progressive. This could be welcome in South Africa where wealth inequality is huge. The Gini Coefficient, which measures the inequality distribution of income, is 0.63, the highest in the world (World Population Review, 2020). It is argued that taxing human has a redistributive effect on incomes to curb inequality as compared to taxing AI (Arndt & Kappner, 2019). Furthermore, South Africa imports of machinery goods equate to 21.3% of total imports (Trading Economics, 2023). Such machinery could qualify for one of the many capital allowances available.

While the rationale and benefits of a tax on robot could be seen as a panacea to the displacement effect by some researchers, the idea has been challenged by others. Mazur (2019) equates robot tax to tax on innovation while it is alluded that the assumptions and methodologies used by proponents of a robot tax are flawed. The idea has been challenged by Kaminska (2017) and Mazur (2019) who question the justification of encouraging investment in machinery as productive yet the investment in AI is considered counterproductive. Oberson (2017) alludes that the doubles loss must consider the benefits of using robots and asserts that innovation increases efficiency and global growth and taxing it would stifle such growth.

Shackleton (2018) opines that there is no individual robot, and one would need to look at value created by a chain of robots and concludes that the idea of taxing robots is ill judged. Some writers rather advocate for a halfway house tax system that is neutral between capital and human labour (Abbott & Bogenschneider, 2018b).

4.4 The Theoretical Lens

Burns and Grove (2001) accentuate that making explicit the researcher's theoretical perspective on the study problem may benefit a study. The theories underpinning this study are the Theory of Optimal taxation by Ramsey (1927) and the Laffer Curve Theory. The Theory of Optimal Taxation posits that the tax system should identify the tax mix that maximises aggregate welfare under constraints. The optimal tax mix is influenced by the definitions of the constraints, the various types of taxes available and aggregate welfare function (Arndt & Kappner, 2019, p. 9). The introduction of robot tax will result in a structural change of the tax mix in South Africa.

The Laffer Curve looks at the nexus between tax rates and revenues. "The economic effect, however, is less obvious dynamic effects; it recognizes the positive impact that lower tax rates have on work, output, and employment and thereby the tax base by providing incentives to increase these activities. Raising tax rates has the opposite economic effect, by penalizing participation in the taxed activities" (Laffer, 2006). Revenue initially increases with the tax rate but can decrease if taxpayers reduce labour supply and investments or switch compensation to non-taxable forms (Durlauf & Blume, 2008). The theory investigates the decisions around tax rates and decisions and is as applied in this study. Figure 2 illustrates the Laffer curve theory.

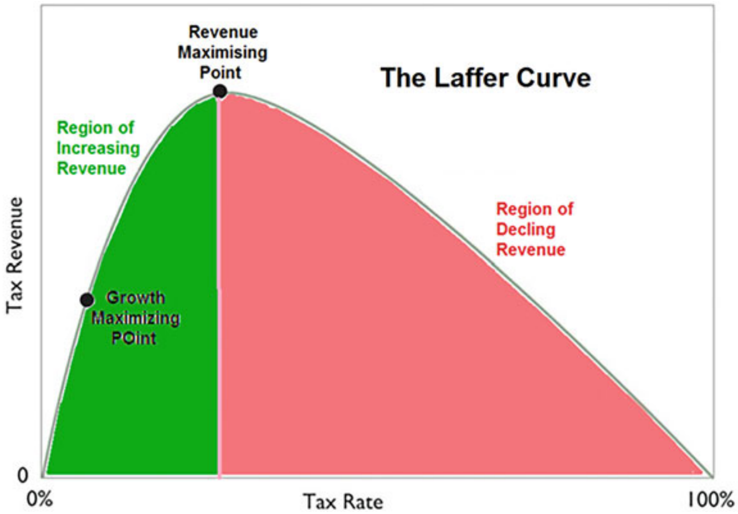

Fig. 2 Laffer Curve. Source: https://fee.org/articles/the-laffer-curve-its-time-to-stop-laughing

It is inferred that the underlying principles of the Laffer curve is based on a possibility that tax on robots would be increased (presumably from zero to X%). At zero percent tax rates, which is the current tax rate for robots, government revenue is zero and firms are logically expected to be inclined to replace human labour with robots. On the contrary, if tax on robots reached 100%, then the firms would be logically expected to be inclined to employ human labour as investment on automation could be too costly. A mid-point where tax revenues are achieved at maximum is indicated in the curve. Any point below or beyond this point leads to a decline in tax revenues. It is imperative that the policy makers charge robot taxes that would be sufficient to make up for lost revenues but attractive enough for investment in automation that achieve the overall economic objectives of the economy and country and maximise the tax revenues from the tax of these factors of production. Cognisance that taxes discourage supply of labour, and they discourage supply of capital over time (Durlauf & Blume, 2008) should be considered by policy makers and a halfway house achieved.

5 Methodology

Semi-systematic, document analysis literature review is the adopted method of data gathering and analysis. According to Morgan (2022) document analysis "consists of analysing various types of documents including books, newspaper articles, academic journal articles, and institutional reports". This systematic review of official and scholarly works was used to uncover the current state of the fiscal policy framework, revealing any gaps or inconsistencies. Documents were collected and analysed using Atlas ti to code the data. Each specific code used related to each possible option of robot tax and these mechanisms were deduced from that analysis.

6 Findings

6.1 Recommended Tax Policy Framework Reform Measures

The Income Tax Act 58 of 1962 (ITA) in its definition of 'gross income; distinguishes incomes of a resident and a non-resident, inferring the resident is with reference to a person, natural or legal. There is no provision for taxation of 'objects or articles like robots.

6.2 Legal Personality and Tax Liability

Incomes are taxable to natural persons and other legal persons entities. It is important that legal personality and tax liability of a robot are established, for a robot to be taxed, if the robot itself is to be taxed and not tax the owner of the robot.

Section 1 of the ITA defines 'gross income' as.

> in the case of a resident, the total amount, in cash or otherwise, received by or accrued to or in favour of such a person resident.

Against the backdrop of this definition, it would be important to give a 'personality' status to the robot. Oberson (2017) highlights that the tax legislator can grant legal personality to robots under civil law as it does not always follow the legal forms designed by civil law if they are properly defined. The same principles used to grant personality to Companies, Close Corporations, Estates and Trusts in South Africa could be used to grant a robot tax personality on that basis. This is based on the principle that a robot has a level of autonomy.

In establishing the 'personality' of robots, one must start with establishing the economic personality of a robot and then deducing if this is enough to trigger (tax) legal personality. There is support for consideration of the ability of robots to pay tax and payment capacity allocated by means of, for example, 'electronic equity' (Oberson, 2017). This is based on their autonomy attribute as well as ability to grant the legal personality and 'ability to pay tax' to a robot. The contention would then be on the amount on which to tax a robot, and this it is argued, that even though a robot does not receive income, notional income can be allocated to it based on Section 1 'gross income' definition principle of 'in favour of'. The income does not have to be in cash as it can be 'otherwise,' which gives room for notional income to be taxable.

6.3 Available Alternative Mechanisms of Taxing Robots

Abbott and Bogenschneider (2018a)) suggest an increase to corporate tax as one of the options, termed a 'digital corporate tax' (Arndt & Kappner, 2019, p. 6). Marwala (2018), Mazur (2019), and Abbott and Bogenschneider (2018b) argue taxing robots is tantamount to increasing corporate tax. It is also alluded that a call for tax on robots as a fallacy that calls for more corporation tax or wealth tax (Kaminska, 2017). It is submitted that the downfall of taxing robots via a blanket increase in corporate tax is that it will not be proportionate to amount of automation employed by a company. This will be detrimental to labour intensive companies as they will subsidise the tax of highly automated companies. Increasing corporate tax could discourage investments in a country and in a developing economy like South Africa, this could be to the detriment of economic growth.

There is a school of thought that believes that to address this conundrum, businesses must pay payroll taxes of workers dispensed off by automation. "A tax calibrated according to the ratio of a company's profit to its employee compensation could match the wage taxes avoided by automation. Companies deploying robots could also be required to pay some kind of fee." (Porter, 2019). Abbott and Bogenschneider (2018a) corroborate this proposition that this tax could be based on a ratio of corporate profits to gross employee compensation expenses. This mechanism serves as a proxy for deciding what companies are making use of intensive automation (Walker, 2019).

Another proposal (Abbott & Bogenschneider, 2018b) is for a corporate self-employment tax to be created for automated firms to substitute for taxes payable on human wages. They allude to further suggesting that tax incentives for human workers (wages) will make them comparably more attractive and making hiring people more attractive. In South Africa, the current individual maximum marginal tax rate is 45% whereas the corporate tax is 27% (28% until 30 March 2023) and this is indirectly funded by companies as it is factored into an employee's remuneration structure. It is conceded that if the individual tax rates were to be reduced to a lower rate, this would make hiring humans more logical. Oberson (2017) supports the notion by suggesting a notional salary taxable on the hands of the robot. The rate of tax based on the cost of the labour replaced, but he cautions that challenges encountered could be for example, that humans have a finite lifespan, unlike robots. Mazur (2019) dissents from this view citing the difficulty in calculating the number of workers displaced. Further questions that could possibly arise are, 'what if certain workers are displaced and other job opportunities created elsewhere?'. This would create a conundrum.

Another alternative (Abbott & Bogenschneider, 2018b) is that companies pay amounts/fee into an insurance plan like the existing unemployment systems, for example the Unemployment Insurance Fund in South Africa administered by the Department of Employment and Labour under the Unemployment Insurance Act 2001 and Unemployment Insurance Contributions Act 2002. It is submitted, in a developing country like South Africa, this method would be practically difficult to determine the optimal value of taxes to be paid.

Orton-Jones (2018) quotes Ian Hughes who suggested that to get around this problem the performance-related levy based on how many compute cycles a task took, billed as a micro-transaction of a robot could be used as a basis for the tax. Non-computerised items would pay zero tax, a similar concept already used in determining Carbon tax charged on the sale of automotive vehicles in South Africa where the tax is based on the CO2 emissions of the car or sugar tax. It is conceded that the anomaly is that a situation could arise whereby the tax raised does not equate to taxes lost due to automation. The Unemployment Insurance Funds would have to be ring-fenced otherwise it will benefit workers displaced due to other reasons and not automation. Company contributions to the UIF and payments to displaced workers would have to be equivalent to after tax amounts as currently UIF benefits are not taxable.

A tax or a fee for using and maintenance of a robot is an alternative mechanism and could be charged levying tax on the work performed by a robot or a fee for using and maintaining a robot. In this case, it is proposed the revenue authorities would need to do a table of rates (on a sliding scale as is currently with individual taxable income in the ITA) prescribing how much tax is payable at what value of use and/or maintenance as a flat fee would violate the principle of equity of tax. The basis of tax could be, for example, the output for the value of use and actual amount for maintenance costs, or any combination.

Other options include taxing a robot by imposing a fee on the turnover (Meisel, cited in Abbott & Bogenschneider, 2018b) or on profits (Abbott & Bogenschneider, 2018b). The challenge with the latter is that profits can be reduced by non-automation related items like finance costs, credit losses and unrealised losses. Profits can be manipulated.

Robots in South Africa can qualify for deduction under some of the capital allowances like Section 12C Accelerated depreciation and Section 11(e) wear and tear. Capital allowances are deducted faster than the cost of the wages on human labour displaced by automation (Abbott & Bogenschneider, 2018a). The alternative approach would be to reduce or even deny the deduction of the wear and tear or accelerated depreciation on the cost of robots. It is proposed that it should be reduced beyond a certain threshold (Abbott & Bogenschneider, 2018a.

Mazur (2019) recommends that current payroll taxes be reformed to minimize impact on labour income and expand burden on capital. It is conceded that although this is not a tax in its real sense, the effect is the same as it reduces the deductible expenses for a firm and increases its taxable income. South Korea, considered to introduce the first form of 'robot tax' in the world implemented such a scheme opting to a reduce automation by removing reducing related tax breaks. Accelerated deduction for human labour should be considered to level the playing fields. Abbott and Bogenschneider (2018a, 2018b)) contend that accelerated deduction "could be designed as an accelerated deduction for future wage compensation expense (i.e., the firm would get an accelerated tax deduction) to match the accelerated depreciation for automated workers".

Other proposed mechanisms include taxing imputed or estimated salary of robots or incomes from activities of robots (Oberson, 2017). Authorities could find it difficult calculating notional incomes under this system. Mazur (2019) queries how the profits or value created by robots could be computed as workers and machines co-operate. It is conceded that this would be easy where there is complete automation by a firm. There is caution against double economic taxation where robots are allocated a theoretical salary, the salary should be deductible in the hands of the company (Oberson, 2017). If the deduction is not allowed, this could lead to profits taxed in the hands of the company, as well as tax on the imputed salary of a robot.

In South Africa, currently profits are taxed on the hands of the company as CIT and wages earned are taxed at the hands of workers (PAYE) and it can be argued that this reverts to some double taxation principles and there is no difference to the current tax legislation. The question would be whether the imputed salary will be deductible in terms of section 11(a) by the company? To maintain equality and fairness, it is proposed that it must be allowable as wages are deductible, otherwise it could be seen as an increase in corporate tax.

"An alternative, simpler or more practical approach may be to tax a lump-sum amount representing an approximated "ability to pay" the tax" (Oberson, 2017, p. 255) It is submitted that this will be difficult to implement as it works on an approximation. This could lead to understated or overstated tax calculated on foregone human wages lost.

Taxing consumption is better suited than taxing output to an output-based systems for efficiency and justice (Arndt & Kappner, 2019, p. 20). VAT on the supply of goods and services by robots could also be levied at a higher rate (Mitha, 2017). Robots' activities would have to be determined to be 'in furtherance of enterprise as prescribed in Section 7 (a) of the VAT Act, the characterisation of these activities (supply of goods and services) and place of supply defined (Oberson, 2017). The cost of robots could be made higher by charging a higher percentage than the current standard rate (15%). Alternatively, VAT input on the purchase of a robot could be denied as is the case with purchase of a 'motor car' as defined in section 1 of the VAT Act. This would exacerbate the cost of investment in automation, discouraging firms in aggressively investing in robots. It should be noted, if output VAT is charged on value added by the robot and on point of sale by the company, it would be 'double dipping' by the tax authorities as output VAT could be collected twice, on the company and the robot. This is taking into consideration that the human labour displaced was not subject to VAT on output but only the company charged output VAT on point of sale. A deeper analysis of VAT effects is beyond the scope of this paper.

A special specific robot tax following the same concept as carbon tax or sugar tax could be introduced. As discussed earlier, a basis, like computer power for example, would be used to calculate the tax payable. An object tax on robots based on ownership and taxed at a flat rate or adjusted with different types of robots (Oberson, 2017). This could also work more like the Turnover tax on businesses that qualify as micro businesses under section 48 of the ITA and be a Robot Turnover Tax based on value of output of a robot.

Another suggestion put forward is that of a Grant Offsetting Tax Profit for human workers (Abbott & Bogenschneider, 2018b). A government grant from the government on firms that employ human labour could be an option of making human labour competitive leading to a tax system that is neutral between capital and human labour (Abbott & Bogenschneider, 2018a). This could be done by repealing employer contributions to the UIF and Skills Development levies and other similar costs incurred by a firm for human labour. The grant would be included in the gross income under S1 definition of 'gross income' but exemption would have to be given under Section 12 of the ITA but it must be listed in the 11th Schedule of the Income Tax Act which list all government grants that are exempt.

Marwala (2018) mentions introducing a universal basic income to deal with the resulting loss of income due to the decrease in employment and personal income, to try and correct the Laffer Curve of overtaxing robots. There is no guidance provided on how this should be rolled out. However, a developing country like South Africa that currently has many people relying on social grants will overwhelm the government purse. It is conceded a more prudent approach would be to allocate the universal basic income to only those retrenched as firms automate.

Increase in Skills Development Levy (SDL) for automated companies to retrain workers is an option. The Skills development levy is currently set at 1% of total amount paid in salaries (including bonuses, overtime, leave pay, commission, and lump sum payments (SARS., 2023). A variable rate depending on a firm's level of automation could be used. The current requirement that an employer becomes liable if they expect their salary bill to be in excess of R500 000 in a 12-month period will need to be expunged or the threshold increased. This revenue raised from automated companies through this fund can be ring–fenced specifically for retraining dispensed workers.

Another possible instrument could include a higher capital gains tax on sale of a robot. Also, a 100% recoupment on disposal of a robot under section 8(4) ITA could be introduced. Section 11(o) option of a scrapping allowance could be denied for disposal of robots.

The challenge in some of the identified alternatives is calculating the number of workers displaced by a robot. In some cases, it could be easier and more complex in others. Mazur (2019) suggests using the ratio of company's revenue to employees as a basis as tax will increase as the sales to workforce ratio increases.

6.4 Policy Considerations and Recommendations in the Implementation of Fiscal Policy Reform of Robot Tax

Cognisance must be taken that certain robots do not produce any reliably measurable output. For example, a traffic light (widely referred to as a robot in South Africa) is not used in the economic value creation chain at the hands of the final user (like Johannesburg Roads Agency). A traffic light replaces a human that directs traffic (Marwala, 2018). Imposing a tax on it at any point will make no logic. The other challenge could be there is no turnover value or equivalent thereof. Options like value-based tax would be difficult to calculate. An option would be to grant a special robot exemption Under Section 10 of the ITA for such robots.

Global developments can affect or influence decisions in South Africa. A pertinent issue to consider is the global stance of taxation of robots. Even though the EU Parliament rejected the proposal of a robot tax, this is not cast in stone and could change in due course. This can change and tax authorities could start seeing this standard practice. If an organization like the Organisation for Economic Co-operation and Development (OECD) gave guidance on how to implement a robot tax, then the world could embrace it.

South African authorities could be cautious however of making rushed decisions on robot tax if the rest of the world is still resisting the idea. Abbott and Bogenschneider (2018b) contend that it could result in increased complexity of the tax system which is not good for international competition. Shackleton (2018) cautions that imposing it in a country, where the rest of the world is not, could discourage investment in that jurisdiction and would reduce the attractiveness to potential investors. Bottone (2018) asserts that cross border tax evasion intricacies must be considered. Jurisdictions like California, Nevada, Massachusetts and Tennessee in the United States and Italy have made various proposals on different forms of robot taxes (Merola, 2022). South Africa can take the leap and implement the robot tax if deemed necessary to protect its sovereign economy and its citizens, like.

The nature of robots is that they are difficult to pin to a particular place. This could result in an increase in appetite for tax avoidance as firms relocate to no-tax or low-tax jurisdictions and be operated remotely (Mazur, 2019. This could lead to lots of changes in international tax concepts and double tax agreements to cater for such avoidance or evasion. An example can be seen in Malaysia that introduced a tax exemption for capital expenditure on manufacturing automation for 2015 to 2017 years for firms involved in rubber, plastic, wood, furniture, and textile and 2015 to 2020 for all other qualifying companies (Orbatix, 2017). The accelerated depreciation was set at 100%. Such policies could attract manufacturing companies to set up automated structures there.

7 Conclusion and Recommendations

The South African fiscal policy framework encompasses a progressive tax system and a focus on promoting inclusive growth and social cohesion. While there are currently no specific tax policies targeting robots, South Africa acknowledges the need to adapt tax policies to technological advancements. Taxing robots presents challenges in defining taxable entities, establishing a stable framework, and considering the economic and social implications. Future policy developments in South Africa will need to address these considerations to ensure fair and effective taxation in the era of automation.

It is recommended that the mix of mechanisms adopted to tax robots should not make companies that automate worse off than when taxing labour but must be sufficient to make up for lost revenues from taxation of wages in line with the Theory of Optimal taxation as well as the Laffer Curve Theory. The principle of fair and equitable taxation must not be foregone. This is to balance between tax revenues needed to provide goods and services and innovation and must not be used as a punitive measure for automation. The advantages and disadvantages of each alternative must be rigorously investigated to that end.

Analysis of cost versus benefits and the sustainability of the public purse from loss in PAYE tax collected versus the benefits of increased productivity from automation and come to a ‘halfway house’ in adherence to the Laffer Curve principles. A profound quote by Laffer, 'at the beginning of a dynasty, taxation yields large revenues from small assessments, and at the end of a dynasty, taxation yields small revenues from large assessments' (Laffer, 2006) implies that any system not equitable towards either, wages tax or robot tax will inevitably be susceptible to decreased taxes from that sector as investment will be discouraged.

There are also opportunities for further research in determining the tax base of a robot for capital gains tax purposes where robot tax is implemented. Further research and analysis are needed to assess the impact of automation on job markets, the tax base, and revenue streams. Policymakers should engage in dialogues with industry stakeholders, academia, and international organizations to navigate the complexities and ensure that tax policies strike a balance between promoting innovation and addressing potential challenges in a manner aligned with South Africa's fiscal policy objectives.

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Analytical Thinking in Accounting Education: Student Use of the Sustainability Accounting Standards Board (SASB) Navigator Database

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Abstract The objective of this study is to explore accounting students' performance on group project tasks, while using a sustainability accounting database. The research question asked is: What is the students' performance in terms of lower- and higher-level thinking skills at a group homework assignment using the SASB Navigator database? This paper presents examples of student work and an accounting instructor's account of a SASB Navigator group homework project assigned to two of her *Introduction to Financial Accounting* classes in the autumn 2020 term at a public university in the United States. A total of 46 students who had limited (just from classroom lectures) requisite knowledge of sustainability accounting and the SASB participated in the research. The paper uses a small-scale case study method. The theoretical framework used is Bloom's taxonomy. Excerpts from the last five of twelve questions asked of the student groups are used as data. Hand-written notes were taken by the instructor in a notebook during and after the autumn 2020 term, with her impressions on how the students performed at the assignment. The questions asked of students necessitated the use of both lower-order and higher-order thinking skills. The student groups generally displayed satisfactory lower- and higher-order thinking skills. Digitally transforming accounting and business processes should be facilitated by educational projects, such as this.

Keywords Environmental · Social · And governance (ESG) · Sustainability accounting standards board (SASB) · SASB navigator

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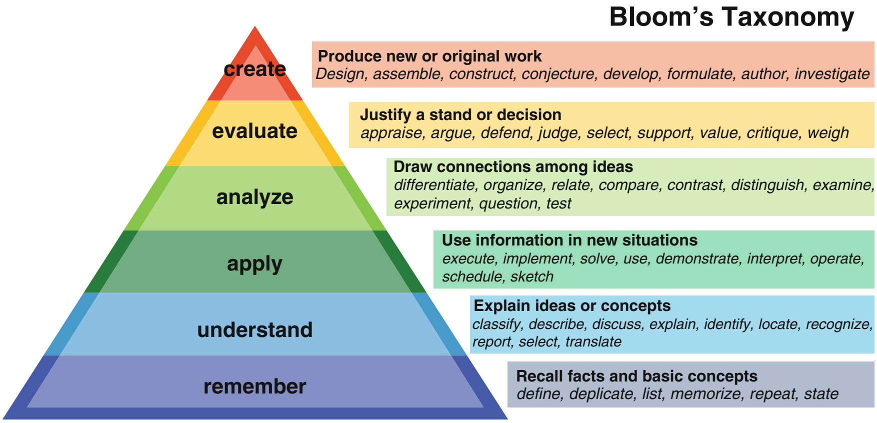


Fig. 1 Bloom's Taxonomy. Source: Bloom's Taxonomy (n.d.)

1 Introduction

Digitally transforming accounting and business processes should start from the classrooms that prepare future accountants and business leaders. Analytical thinking skills are vital for accounting and business students and professionals because these abilities lead to student success and facilitate decision making. Analytical or critical thinking capabilities are among the upper-level skills according to Bloom's taxonomy (Bloom's Taxonomy, n.d.). This taxonomy consists of several skill levels: (1) remembering, (2) understanding, (3) applying, (4) analysing, (5) evaluating, and (6) creating, in ascending order of critical thinking intensity. Figure 1 shows the skills pyramid of Bloom's taxonomy. This research utilises Bloom's taxonomy as its theoretical framework.

2 Background

There are several sustainability reporting frameworks used globally: the Carbon Disclosure Project (CDP), the Climate Disclosure Standards Board (CDSB), the Global Reporting Initiative (GRI), the Science-Based Targets initiative (SBTi), the Task Force on Climate-Related Financial Disclosures (TCFD), the United Nations' (U.N.) Principles for Responsible Investment (PRI), and the World Economic Forum's (WEF) Stakeholder Capitalism Metrics. The SASB framework joins them as a relatively recent framework. Founded in 2011, the SASB is a non-governmental organisation (NGO) issuing industry-related disclosure standards to enterprises on various ESG accounting topics. Whether or not an enterprise participates in the SASB is voluntary. The NGO launched the SASB Navigator database in October 2016. This database "combines financial material sustainability information with data and analytics to help users understand and analyse industries and companies' sustainability performance and disclosure" (SASB Releases, 2016).

In the context of the SASB Navigator's use in accounting education, Bloom's taxonomy can be insightful to analyse student outcomes. It is important to note that accounting and business education need to transition from lower-order skills (remembering and understanding) to higher-order skills (analysing, evaluating, and creating) since future accounting and business professionals need to be independent thinkers who make important industry decisions based on causality and relevance, among other considerations.

Digitally transforming accounting and business processes is also pertinent to sustainability accounting. This type of accounting has been researched in pedagogical contexts (Boyce et al., 2012; Contrafatto, 2013; Coulson & Thomson, 2006; Owen, 2001; Wong et al., 2021). Kondarevych et al. (2020) discuss Industry 4.0 as the industry that digitally transforms business processes in enterprises. This digital transformation should be addressed in the business and accounting classroom, as well.

3 Aim, Research Question, Research Method, and Delimitations

The aim of this study is to explore accounting students' performance on group project tasks, while using the SASB Navigator database. To our knowledge, very few studies on the student experience with the SASB Navigator database have been conducted (Blaber & Gougoumanova, 2022; Palatnik et al., 2021). The research question asked is: What is the students' performance in terms of lower- and higher-level analytical thinking skills at a group homework assignment using the SASB Navigator database?

This paper uses the case study research method. According to Denscombe (2021), case studies provide an in-depth account of events or processes happening in one instance (in our case, two sections of a university course). Cases exist prior to the research itself and they will continue existing after the study is completed since they happen in their natural environments, argues Denscombe. This author also purports that each case has a clearly defined boundary since it is self-contained. Finally, a case shares typical features with other similar cases; in this study, "other similar cases" are other potential online homework assignments that will use the SASB Navigator. Thus, case studies can examine a particular event or occurrence to make generalisations, Denscombe argues. This paper's data collection method consists of select excerpts from student written work from a group homework assignment—a small-scale case study. This study is qualitative in nature.

As to the case study's delimitations, its major weaknesses are the small student sample size (46 students) and short timeframe (a single university term–autumn 2020). Learners in only two accounting classes were selected for this research since at the time of the study, the SASB Navigator university licenses were about to expire soon. Future research could include more students from various accounting classes and from different terms to provide a more lucid picture of broader student outcomes on SASB Navigator-based assignments.

4 Teaching Tool

This paper presents examples of student work and an accounting instructor's account of a SASB Navigator database group homework project assigned to two of her *Introduction to Financial Accounting* classes in the autumn 2020 term at a public university in the United States. The paper uses excerpts from the last five of twelve questions asked of the student groups.[1] Hand-written notes were taken by the instructor in a notebook during and after the autumn 2020 term, with her impressions on how the students performed at the assignment. The questions asked of the groups are listed in the appendix. The appendix also provides the instructions given to the student groups by the lecturer.

The first two questions required the use of lower order thinking skills (remembering and understanding), and they were based on following the lecturer's assignment instructions and making observations. For example, Question 1 required students to cite from annual or quarterly reports, and Question 2 was a 'What?' question. Questions 3 and 4 required the use of higher-order thinking skills since they included the word 'Why?' (causation) and since they were based on applying knowledge and analysing and evaluating information. Question 5 was open-ended, and it required giving an opinion. The five questions encouraged following the instructions of the lecturer (easier task) and applying analytical thinking skills (more difficult task).

Forty-six students (22 and 24 per class) who had limited (from classroom lectures) requisite knowledge of sustainability accounting and the SASB were given licenses for the SASB Navigator database. This database provides information on the quality of U.S. SEC's filers' ESG disclosures. The students completed a marked group homework assignment in sixteen groups of one to four students. The groups were assigned a letter from A to P as a group identifier. All groups were composed of three students, except for Groups H, N, and P which were comprised of one, two, and four students, respectively. Toward the end of the term, some groups lost members due to students' withdrawal from the class. Institutional Review Board (IRB) approval was obtained from the University on November 19, 2020.

[1] The first seven of the twelve questions are discussed in Blaber and Gougoumanova (2022).

5 Data Presentation and Analysis

Below are some of the groups' responses to the last five questions of the homework assignment (here, they are numbered Questions 1 to 5).

Question 1: Please provide some excerpts from your chosen non-U.S. company's U.S. SEC filings (Hint: Click on the blue "Excerpts" button on the left; these are excerpts from the company's SEC filings–annual report (Form 10-K), quarterly report (Form 10-Q), etc.).

The groups selected different companies. Group B for example chose the Japanese Toyota Motor Co. This group wrote (Please see Image 1): **Image 1:**

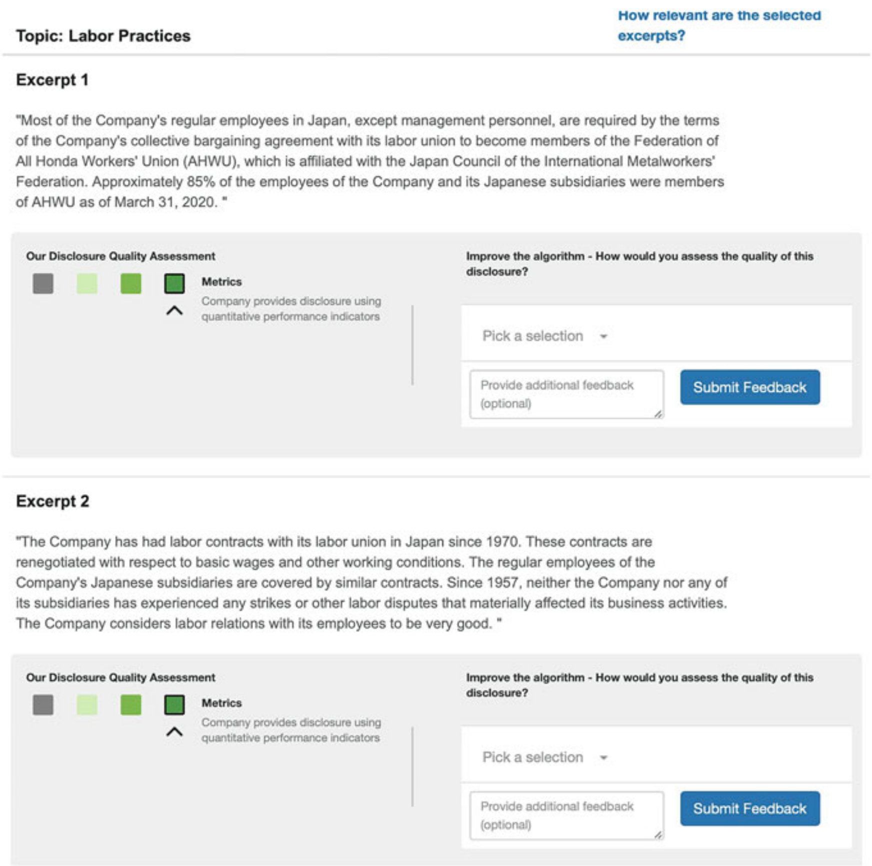
Excerpt 1

"In addressing environmental issues based on an assessment of the environmental impact of its products through their entire life cycles, from production through sales, disposal and recycling, Toyota as a manufacturer, strives to take all possible measures from development stage and continues to work towards technological innovations to make efficient use of resources and to reduce the burden on the environment."

Excerpt 2

"In Japan, basic wages and other working conditions are negotiated annually. In addition, in accordance with Japanese national custom, each employee is also paid a semi-annual bonus. Bonuses are negotiated at the time of wage negotiations and are based on Toyota's financial results, prospects and other factors. The average wage increase for all union members, excluding bonuses, in Japan was approximately 2.39% in fiscal 2020."

Group E who chose another Japanese company, Honda Motor Co., provided the following excerpts (Please see Image 2): **Image 2:**



The four excerpts in Images 1 and 2 above are indeed about the environmental and social disclosures of U.S. SEC filers. Students from these and other groups showed a tendency to follow closely the lecturer's instructions by providing relevant excerpts from the SASB Navigator. Question 1 required the use of a lower-level thinking skill according to Bloom's taxonomy–understanding and applying knowledge.

Question 2: What is the quality of the company's sustainability disclosures? (Hint: According to the legend on the upper right-hand side of most database images, dark green is the highest quality disclosure (numeric/metrics/quantitative), light green is company-tailored narrative (non-numeric/qualitative/a lower quality of disclosure), and grey is no disclosure at all.).

Group H who selected Sony wrote: "For 2019 the only information available is Product Security and the disclosure quality is Boilerplate and the rest is no disclosure."

Group E shared:

Disclosure intelligence ranks a company's disclosure quality based on if it uses quantitative performance, company tailored narrative, boilerplate (which is generic language), and finally no disclosure. As we can see Honda is pretty good at disclosing information based on labour practices, and product safety but fails to mention information such as material sourcing, material efficiency and fuel economy and emissions.

Group B (Toyota Motor Co.) wrote:

Labor Practices has the highest quality of sustainability disclosures. Followed by that is Product Safety. However, the quality quickly decreases with Fuel Economy and Use-Phase Emissions as the quantitative variables decrease greatly between the disclosures. Materials Efficiency and Recycling doesn't have the most quantitative variables, but because it has more grey area and less quantitative variables, it has a lower quality. The lowest quality is Materials Sourcing. It has the most grey area and holds no qualitative variables.

Generally, the groups provided satisfactory answers to Question 2. This question was observation- and understanding-based, and it did not require the use of advanced analytical thinking skills. The groups mentioned "quantitative" disclosures, "Boilerplate" disclosures, and "non-disclosures," as prompted by the colour scheme of the SASB Navigator.

Question 3: Do you think that sustainability disclosures should be treated as equally important to investors, creditors, and the public as financial disclosures (such as the financial statements)? Why or why not?

Group J (Honda Motor Co.) noted: "Yes, we think that the sustainability disclosures should all be treated equally because it would provide investors and other market participants better and more information to all companies yearly reports."

Group P wrote:

This is really critical to your investors, creditors, and the public as essential information that should be consumed by the public and financial contributors. These sustainability disclosures do things such as measuring performance and setting attainable goals. Think of the information that is kept away from the public and their investors, they should be treated similarly, with full transparency. These financial reports are the source of information that people understand and feel safe about investing in the organization.

Contrary to Groups J and P, Group B shared:

Not at all. While they should all be taken into account for investors, creditors, and the public, they should have individual weights. For instance, Labor Practices would fluctuate very infrequently by comparison to Fuel Economy and Use-Phase Emissions or Materials Sourcing. So, by this logic, Labor Practices would have less of a weight in the overall effect on the financial standings of the corporation.

In addition, Group E wrote:

I think sustainability disclosures should be treated as almost important as financial reports. I think financial reports are a very great indicator of how a company is doing financially and usually it is easy to tell whether or not a company is going to succeed or not based on their financial conditions. As we see with Honda Motors Company, they did not score well on their sustainability disclosures, and we see their revenue based on their income statement as decreasing. I believe financial and sustainability reports go hand in hand with each other and if Honda does not move towards electric vehicles, we might see their revenue decrease by even more over the years.

	Fiscal years ended March 31,		
	2018	2019	2020
		Yen (billions)	
Motorcycle Business	¥ 2,038.7	¥ 2,100.1	¥ 2,059.3
Automobile Business	10,852.1	11,072.1	9,959.0
Financial Services Business	2,123.1	2,365.3	2,586.9
Life Creation and Other Businesses	347.0	350.9	325.6
Total	¥ 15,361.1	¥ 15,888.6	¥ 14,931.0

As we can see their automobile revenue has decreased more than other revenue.

Group H shared:

Yes, I think sustainability disclosures should be treated as equally important to investors, creditors, and the public. I believe that it will only benefit a company if they are more transparent. When a company is transparent, it builds trust which benefits the company by increasing business transactions and relationships. The sustainability disclosures will also help investors improve their investment and voting decisions because they will be looking at the business through different perspective beyond the financial lens. I believe that the public should have access to the social and environmental impacts that comes from producing the company's good and services too as that can directly impact people's lives.

Based on the examples of student work above, most groups agreed that sustainability disclosures needed to be treated as equally important as financial disclosures. Group B disagreed and argued: "Not at all." The critical thinking question: "Why or why not?" was not always clearly answered, but the answers revolved around providing more information to interested parties for decision making and building trust. Group H gave the following reason for the equal importance: "I believe that it will only benefit a company if they are more transparent." Overall, the quality of the English language (grammar and style) was not very satisfactory, a fact that obscured the clarity of the answers to the "Why or why not?" question.

Question 4: How did you like the SASB Navigator? Why?

Group H wrote: "I enjoyed using the SASB Navigator. I like the different information that you can look up such as financials, different services and consumer goods. You can see which companies disclose their information and how transparent they are."

Group E shared:

I enjoyed the SASB navigator because it offers tons of information on a company's financial position as well as their goals and plans for the future. It was very interesting to look at a company as big as Honda and see huge numbers in their financial statements. I also was not familiar with sustainability accounting and learned a lot while exploring the SASB Navigator.

Group B noted:

It was easy to use after a little while. However, everything is compact. For instance, when asking for excerpts from the SEC filing, the first instinct was to go to the SEC Filing. However, this was a Form 20-F, rather than 10-K or 10-Q. Also, a lot of the companies did not have disclosures available. So, it was difficult to search for a company that offered what was needed.

Group J wrote:

We all had a good experience with using the SASB navigator because the organized database was set up for us to navigate through. We learned more important things about investing and the different market standards that can help us further in this field.

Group P shared:

The Sustainability Accounting Standards Board navigator was a very eye-opening experience that I have not really had with any type of platform. You get see what these non-profit organizations are all about. This platform showed full transparency within its group or organization. Personally, I have not used this database ever on campus, but I am glad I was introduced to it.

The answers to Question 4 displayed the fact that the students had a positive experience, while using the SASB Navigator. The learners liked the fact that they saw “huge numbers” and that they became introduced to sustainability accounting and to the International Financial Reporting Standards’ (IFRS) Form 20-F. Group P wrote that the companies included in the SASB Navigator were “non-profit organizations,” a fact that is not true. The companies included there are for-profit, publicly traded corporations in the U.S.

Question 5: Anything else you would like to share about your work with the SASB Navigator?

Group B wrote:

It wasn’t until after the SEC question was complete that it was realized where the SEC Filings were. So, the company that was originally chosen was changed to Toyota Motor. However, had this been caught previously, the company would have been Forward Pharma A/S, Denmark.

Group H noted: “The SABS Navigator organizes different information about different companies well. I like how you can find the companies based on their sector and industry and how the disclosures are divided by topics.”

Group J wrote: “My group members and I had a good experience with using this database for the first time and thought it was interesting to see the different disclosures.”

Group P elaborated:

The SASB is a great tool because it gives graphs and statistics about not just about the organization that you are looking at, it gives contrast to similar organizations and why they are unique in their own way. The disclosures are also given the opportunity for people that are navigating through the database to examen the organization and view the positive and negative information about the company, which helps individuals choose if they are interested in the company or not.

Two groups did not provide an answer to Question 5. The four answers to this question provided above showed that the students reiterated that they had a positive experience using the SASB Navigator. The answers to Question 5 were similar to the answers to Question 4. Group B acknowledged the fact that they had not seen the location of the U.S. SEC filings of their chosen enterprise, and that they had changed companies because of this omission. Group P made some spelling mistakes (e.g., "examen") and used long sentences; but overall, they appreciated the fact that the SASB Navigator compared and contrasted companies from the same sectors and industries.

6 Discussion and Conclusion

The research question asked in this paper was: What is the students' performance in terms of lower- and higher-level thinking skills at a group homework assignment using the SASB Navigator database? The outputs of the group assignment discussed above (select groups' answers to Questions 1 to 5) showed that students generally displayed satisfactory to the instructor lower- and upper-level thinking skills. Satisfactory student performance is a subjective concept; however, in most cases, student work met the instructor's expectations of undergraduate students' grasp of sustainability accounting topics and command of English grammar and style. Mostly, students followed the lecturer's written instructions from the appendix. Nevertheless, there were some missing answers to questions. This study filled the gap in the accounting and business education literature related to the SASB Navigator's usage by students. Building on Blaber and Gougoumanova (2022) and Palatnik et al. (2021), this study shed some light on Bloom's taxonomy of lower- and higher-order thinking skills in the context of sustainability accounting pedagogy.

The students in this study used a new accounting information systems tool–the SASB Navigator–and they learned about ESG reporting quality. The instructor had lectured on sustainability accounting and reporting in class prior to this homework assignment; thus, students had some prior knowledge of the topics discussed. Besides, by having to choose a non-U.S. company traded on a U.S. stock exchange (the NYSE or the NASDAQ), the learners expanded their international perspectives. Digitally transforming accounting and business processes in an international context should be facilitated by educational projects, such as this. The authors encourage accounting and business educators to implement SASB Navigator-based student projects in their classrooms since this database provides a sneak peek at what future accountants and businesspeople are working with at the workplace. A possible student SASB Navigator assignment would be to create ("Create" is the highest level of Bloom's taxonomy.) an ESG disclosure framework of their own. This new ESG framework may borrow elements from existing ESG frameworks, including the SASB's. Using the SASB Navigator in the classroom benefits not only students, but also universities–it helps maintain business school accreditation by proving to the accreditation body that students have been exposed to cutting-edge technologies and hands-on experiential learning.

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