Understanding Sustainability Practices Through Sustainability Reports and Its Impact on Organizational Financial Performance

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Abstract. Beyond publishing annual reports, which document organizational activities and their financial performance, organizations are increasingly publishing sustainability reports to inform stakeholders and the public about their sustainability practices. This raises the question as to whether there is a correlation between sustainability practices and financial performance. However, sustainability reports contain huge bodies of text, and much time is required to analyze the content manually. Hence, text mining was employed in this study, by which the top-ten sustainability-related words in the sustainability reports were identified. Subsequently, these ten words were mapped to 5 UN SDGs: (1) Goal 3: Good health and well-being, (2) Goal 8: Decent work and economic growth, (3) Goal 9: Industry, innovation, and infrastructure, (4) Goal 12: Responsible consumption and production, and (5) Goal 13: Climate action, which were categorized into three themes: (1) Social (Goal 3), (2) Economic (Goal 8 and 9), and (3) Environment (Goal 12 and 13). The relationship between organizational sustainability performance and financial performance was subsequently examined with correlation analyses. The results revealed that organizations with higher FTSE Russell ESG ratings had higher GTI scores, which indicates higher transparency in their reporting. Organizations with higher FTSE Russell ESG ratings also had lower net profits, although the average net profit for these organizations was positive. Furthermore, no statistically significant relationship between FTSE Russell ESG and ROE was found. These findings suggest that ESG-rated organizations are still profitable, and that there is value in investing in ESG-rated organizations. Findings from this study provide an overview of the sustainability practices that local organizations are practicing, and could serve as a reference for other organizations to move towards a green economy.

Keywords: Sustainability reporting · UN SDG · Sustainability practices · Financial performance · Return on equity

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1 Introduction

In 2015, the United Nations (UN) Sustainable Development Goals (SDGs) were introduced with the aim of spurring global efforts to tackle climate change and obtain a sustainable future. Following the introduction of the SDGs, Singapore has also announced her goal to transform the nation into a sustainable city by 2030 with the SG Green Plan. One key highlight of the plan is to move the nation towards a green economy, by encouraging local organizations to engage in sustainable practices (SG Press Centre 2021). To encourage organizational sustainability practices, organizations listed under the Singapore Exchange (SGX) are required to publish annual sustainability reports, in addition to their annual reports, to inform stakeholders and the public about their sustainability practices (Liu et al. 2019). However, there is a lack of studies mapping organizational sustainability-related trends and themes to the UN SDGs. This is important as the UN SDGs serve as a framework to move towards global sustainability by 2030.

Mixed results were reported in studies aiming to understand the relationship between organizational sustainability performance and financial performance. Specifically, most studies have found a positive correlation; some studies found no correlation; and a handful reported a negative correlation between corporate environmental responsibility and their financial performance as reported in a review by Peloza (2009). This difference in results was attributed to the different metrics used to measure environmental performance (Liu 2020), which ranged from measuring the level of environmental pollution in organizations to the environmental awards received (Peloza 2009). In recent years, market benchmarks for sustainability performance, such as the FTSE Russell ESG rating (FTSE Russell 2018), which captures the environmental, social, and governance (ESG) aspect in organizations has been developed to serve as a standardized benchmark to evaluate organizational sustainability performance. As such, the use of ESG ratings as a metric for measuring organizational sustainability performance has been encouraged (Liu 2020). However, there is a lack of studies examining the relationship between organizational ESG ratings and financial performance in the Asian context despite Asia having the largest regional economy (Tonby et al. 2019). Hence, this lack provides an impetus to look at ESG-rated organizations in the Asian context.

In view of these gaps in literature, the current study has two aims: (1) Identifying the contributions by local organizations towards the SDGs through text mining, and (2) Determining the relationship between sustainability efforts and financial performance in local organizations. Organizations in Singapore were used as an Asian case study due to policies that required sustainability reports to be published, which would facilitate analysis. The results obtained in this study would contribute to our understanding on the current sustainability priorities in local organizations, as well as understanding the value of engaging in sustainability practices, in the context of Singapore as an Asian context.

2 Methodology

2.1 Data Collection

To understand the relationship between sustainability practices and organizational financial performance, organizations that subscribe to sustainability reporting in SGX were shortlisted for data collection. Specifically, 3 types of indicators were extracted from the SGX website: (1) Sustainability performance indicator: FTSE Russell ESG rating, (2) Sustainability report transparency indicator: Governance and Transparency Index (GTI), and (3) Financial performance indicators: Net profit and Return on equity (ROE). In addition to net profit, ROE, which has been used in literature as a financial performance indicator for organizations (Prado et al. 2020), was included in this study as it measures organizational profitability in terms of shareholders' equity. All values of the indicators were for the year 2021. The rationale for extracting the FTSE Russell ESG rating is due to the nature of the data being a scale variable, which allows for quantitative analyses with the other indicators. The FTSE Russell ESG rating, GTI, net profit, and ROE, were reported for 36 organizations. Analyses were conducted with these 4 indicators using IBM SPSS Statistics 26, and a two-tailed test at 0.95 confidence was used.

The latest electronic copies of the organizational sustainability reports were downloaded from the website of 36 organizations. As the sustainability reports for 2021 will only be released by the first quarter of 2022, the sustainability reports for 2020 were used, since these were published by the first quarter of 2021. Out of the 36 organizations, 3 organizations did not publish a sustainability report for 2020 and 1 other organization had their sustainability report locked via password protection. Hence, a total of 32 sustainability reports for 2020 from 32 organizations were collected electronically for text mining. To overcome the voluminous amount of text, text mining was employed to analyze the content of organizational sustainability reports by identifying the trends and themes in their sustainability practices, which has been reported in literature (Liew et al. 2014; Modapothala et al. 2010).

2.2 Procedure for Text Mining

2.2.1 Gathering and Converting Sustainability Reports to Plain Text Format

The 32 sustainability reports that were fully accessible were downloaded in portable document format (PDF) from the respective organization website. To facilitate the text mining process, all 32 PDFs were converted to plain text format with Adobe Acrobat Pro DC. To avoid repetition of information, cover pages, content pages, figures, and tables were removed during the conversion process.

2.2.2 Text Mining with RapidMiner

Text mining was conducted with an open-sourced software, RapidMiner (Liew et al. 2014), with its Text Processing Extension. Eight steps were involved, which are presented in Table 1 together with its functions. In addition, pruning was conducted, such that words appearing in 2 or more sustainability reports were included for analyses. To understand the focus of sustainability practices in organizations, frequency statistics were collected during text mining. Specifically, 2 types of statistics were collected: (1) Organizational involvement, which measures the degree of involvement organizations have in a particular issue, and (2) Word occurrence, which measures the degree of occurrence for a term in the sustainability reports. The mathematical formulas to calculate the two statistics are presented below:

$$\text{Organizational involvement} = \frac{\text{No. of sustainability reports that contain a word 'x'}}{\text{Total number of sustainability reports}} \times 100\% \quad (1)$$

$$\text{Word appearance} = \frac{\text{No. of times word 'x' appears in the sustainability reports}}{\text{Total number of words in the sustainability reports}} \times 100\% \quad (2)$$

Table 1. Steps used for text mining and its respective function

Step	Function
Step 1: Transform cases	To ensure uniformity in text type, all texts were transformed into lower case
Step 2: Replace tokens	Words that are presented in different variations are replaced to the common term For example, the words "Covid pandemic", "Covid19", and "pandemic" were replaced with "Covid"
Step 3: Tokenize	To obtain smaller units of text, all texts were split at non-letters
Step 4: Filter tokens by length	Tokens were filtered by length, such that all filtered texts have a minimum length of 3 characters. This helps to remove single-lettered alphabets and two-lettered tokens that might be too short to have meaning
Step 5: Filter English stopwords	Words were filtered by a list of built-in English stopwords in the software
Step 6: Filter stopwords	To further refine the text, irrelevant words, such as the name of the organization, were entered as stopwords, and subsequently filtered away
Step 7: Generate n-Grams	n-Grams, with n $<$ 2, were generated. This meant that only words, as opposed to phrases were generated. This step also helped in removing duplicated words in phrases
Step 8: Stemming	Stemming was conducted to remove suffixes, such as "-ing", in the terms. This helps to further group words with the same stem together to avoid double counting

3 Results and Discussion

3.1 Themes in Organizational Sustainability Practices

The entire corpus of 32 reports yielded 20,022 words, and was reduced to 7286 words after text mining. From there, based on the highest percentage value for both organizational involvement and word appearance, the top-ten sustainability-related words were extracted manually, which are presented in Table 2.

Table 2. Results of the top-ten sustainability-related words from text mining arranged in decreasing organizational involvement

Rank	Word	Organizational involvement (%)	Word appearance (%)
1	Employee	96.88	39.69
2	Business	93.75	23.36
3	Environment	93.75	21.52
4	Energy	93.75	16.24
5	Training	93.75	10.50
6	Social	93.75	10.23
7	Community	93.75	9.40
8	Emissions	93.75	9.00
9	Safety	90.63	17.12
10	Health	90.63	13.63

3.1.1 Drawing Links to the UN SDGs

To better understand the prioritized sustainability themes endorsed in local organizations, the top-ten sustainability-related words were mapped to the UN SDGs. Subsequently, themes relating to the SDGs were identified. The result of this mapping is presented in Table 3.

Five SDGs, which belonged to three themes, were subsequently mapped in the analysis. First, Goal 8 and Goal 9 of the SDGs were mapped under the "economic" theme as they relate to initiatives, such as employee training, that would contribute to organizational economic growth. Apart from the "economic" theme, two non-economic related themes, "social" and "environment", were identified. Goal 3 of the SDGs was parked under "social" as it aims to promote healthy lives and well-being for individuals at all age groups. Efforts under this theme extend beyond promoting employee welfare, to the local community. The third theme "environment" encompasses goals 12 and 13 of the SDGs, which focus on environmental efforts, such as the adoption of renewable energy to reduce carbon emissions, to act against climate change.

Together, these three themes of economic, social, and environment, which encapsulate 5 SDGs, were identified as sustainable priorities in local organizations' sustainability

Table 3. Mapping of the top-ten sustainability-related words to the UN SDGs

Theme	Social	Economic		Environment	
SDG No	Goal 3	Goal 8	Goal 9	Goal 12	Goal 13
Name of SDG	Good health and well-being	Decent work and economic growth	Industry, innovation, and infrastructure	Responsible consumption and production	Climate action
Top-ten sustainability-related words	• Social • Community • Safety • Health	• Employee • Business • Training		• Environment • Energy • Emissions	

report for the year 2020. Beyond initiatives that solely boost economic growth, the value of expanding the organization's focus to incorporate social and environmental initiatives for sustainability can also be seen in non-Asia profit-making organizations (Epstein et al. 2015). As a whole, these efforts towards sustainability contribute to the UN SDGs.

3.2 Relationship Between Sustainability Practices and Financial Performance

Before correlation analyses were conducted, all variables were tested for normality with the Shapiro-Wilk test. The test revealed that the FTSE Russell ESG ratings ($p = 0.980$) and GTI scores ($p = 0.667$) follow a normal distribution, while data on the net profit and ROE did not follow a normal distribution ($p < 0.05$). Hence, the Pearson correlation was conducted for FTSE Russell ESG Ratings and GTI scores, while the Spearman correlation was performed with data on net profit and ROE. Results from the correlation analyses are presented in Table 4.

Table 4. Results from the correlation analyses

	FTSE Russell ESG	GTI	Net Profit	ROE
FTSE Russell ESG	1	0.374[a]	−0.391[a]	0.075
GTI	–	1	−1.84	−0.31
Net Profit	–	–	1	0.427[b]
ROE	–	–	–	1

[a]Correlation is statistically significant at the 0.05 level
[b]Correlation is statistically significant at the 0.01 level

With regards to organizational transparency in reporting, the average GTI score for the 36 organizations is 97.70, with a minimum and maximum of 61 and 128 respectively. The lowest score for GTI, 61, was two times more than the minimum score of 30 (Mak 2009), which convey a relatively high degree of transparency in organizational governance disclosure and practices, financial transparency, as well as investor relations. The result from the correlation analysis revealed that there is a statistically significant relationship between FTSE Russell ESG rating and GTI score. Specifically, organizations with a higher FTSE Russell ESG rating had a higher GTI score, suggesting that organizations with a higher sustainability performance were more transparent in reporting. This is supported by the agency theory, which suggests that organizations engage in sustainability disclosure to create value for shareholders (Omair Alotaibi and Hussainey 2016). This implies that organizations with a higher level of sustainability performance would engage in a higher level of disclosure and reporting, to promote the value of the organization to existing or potential shareholders.

To understand the relationship between sustainability and financial performance, correlation analyses were conducted. A statistically significant negative relationship between FTSE Russell ESG rating and the organizations' net profit was found. This finding is in line with research which found that organizations with a higher score on sustainability performance do not capitalize as much as those with lower sustainability performance (Xiao et al. 2018). One possible explanation to this finding is through the agency theory, which suggests that during times of low profitability, such as the ongoing Covid-19 pandemic, organizations engage in more sustainable practices for a competitive advantage over other organizations, as well as for long-term financial gains (Reverte 2009). As costs related to environmental management is increasing (Barbera and McConnell 1990), there is a trade-off between the level of sustainability practices engaged and immediate profit. In addition, it is worth noting that though a negative correlation was observed, the average net profit generated by these 36 organizations practicing sustainability is still positive, at 22.31%, in this study (refer to Table 5). This is supported by literature which found that positive financial performance is achieved in organizations with social and environmental initiatives (Margolis and Walsh 2003). Hence, explaining for the negative correlation between FTSE Russell ESG and organizations' net profit.

Table 5. Descriptive statistics of the indicators on sustainability and financial performance

	Range		*M*	*SD*
	Minimum	Maximum		
FTSE Russell ESG	1.20	4.00	2.70	0.61
Net Profit (%)	−85.18	157.62	22.31	38.16
GTI	61.00	128.00	97.70	14.96
ROE (%)	−21.13	33.87	6.53	9.18

In addition to net profit, a correlation analysis between FTSE Russell ESG rating and ROE was conducted. In contrast with net profit, which takes into account organizational revenue and costs, ROE measures the rate of return on the shareholders' investment in the organization. A statistically significant correlation between FTSE Russell ESG rating and ROE was not found in this study. This suggests that there is no statistically significant relationship between sustainability performance and the profitability of organizations, in relation to their shareholders' equity. This finding is similar to literature which did not find a statistically significant relationship between organizational sustainability performance and ROE (Castro Sobrosa Neto et al. 2020), and no cost in investing in organizations engaging in ESG (Limkriangkrai et al. 2017). Still, the average ROE for the 36 organizations is positive, at 6.53% (refer to Table 5), suggesting a positive degree of efficiency in utilizing shareholders' equity to generate income for the organization. This is supported by the statistically significant positive correlation between net profit and ROE, where organizations with higher ROE have higher value in net profits. Thus, highlighting that there is still value in investing in companies with ESG ratings. During the text mining analyses, in addition to the top-ten words related to sustainability, the word "Covid" was also widely documented across the sustainability reports. Specifically, the organizational involvement and word appearance values were 96.88% and 16.79% respectively, which becomes the second most frequently documented word in the sustainability reports. This suggests that the Covid-19 pandemic has been identified as important to local organizations, which could have impacted net profits as discussed previously.

As compared to pre-Covid-19, businesses from all over the world have reported a fall in earnings during the pandemic (Buckley et al. 2021). This implies that initiatives towards ESG would now need to take into consideration the ongoing pandemic. The average 2021 GTI score for the organizations in this study was 97.70, which is three times that of the minimum score of 30 (Mak 2009). In addition, organizations with higher FTSE Russell ESG ratings had statistically significant higher GTI scores. The findings are encouraging as it implies that these organizations are transparent in their reporting. Next, with the environmental and financial performance data from 2021, this study found that organizations with a higher FTSE Russell ESG rating had statistically significant lower net profits, which were still positive rather than negative. Furthermore, although there is no statistically significant relationship between FTSE Russell ESG rating and ROE, the average ROE is still positive, implying that there is still value in investing in organizations practicing ESG. Overall, these findings suggest that there is still a relationship between environmental and financial performance, and it is still valuable for companies to engage in ESG from the stakeholders' point of view, when examined during the time of the Covid-19 pandemic.

To better understand if there are differences between organizational environmental and financial performance pre- and post-Covid-19, future studies could expand beyond the current study to analyze organizational environmental and financial performance data published before 2020. Also, sustainability reports published before 2020 could be analyzed and compared against the period of the Covid-19 pandemic. Beyond the latest 2020 organizational sustainability reports and 2021 FTSE Russell ESG and financial performance data, future studies could build upon the current study to analyze subsequent sustainability trends in organizations.

4 Conclusions

Together, the results obtained in this study revealed the current sustainability priorities in local organizations in Singapore as the Asian context, as well as the relationship sustainability performance has with financial performance. With text mining, the top-ten sustainability-related words in the organizational sustainability reports were identified. From there, these ten words were mapped to 5 UN SDGs: (1) Goal 3: Good health and well-being, (2) Goal 8: Decent work and economic growth, (3) Goal 9: Industry, innovation, and infrastructure, (4) Goal 12: Responsible consumption and production, and (5) Goal 13: Climate action. These 5 SDGs were identified to be under three themes: (1) Social (Goal 3), (2) Economic (Goal 8 and 9), and (3) Environment (Goal 12 and 13). To understand the impact between sustainability practices and organizational financial performance, correlation analyses were conducted. It was found that the average GTI score for these local organizations were approximately three times higher than the benchmark score of 30. Also, organizations with higher FTSE Russell ESG ratings had higher GTI scores. This indicates that organizations engaged with ESG were transparent in their reporting. With regards to financial performance, organizations with higher FTSE Russell ESG ratings had lower net profits, though the average net profit was still positive, suggesting that there is still value in sustainability practices. There was no statistically significant relationship between FTSE Russell ESG and ROE. Still, the average ROE was positive, which implies that there is value in investing in ESG-rated organizations. The findings from this study provide an overview of the sustainability practices that local organizations are practicing, and could serve as material to help other organizations to move towards a green economy. In addition, the findings, which were based in Singapore as the Asian context, could be utilized by organizations beyond Singapore as they move towards sustainability practices specifically focusing in the Asian region.

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