The Impact of Emerging Technologies on Accounting and Promises to Minimize Operational Costs

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1 Introduction

Emerging technologies bring numerous benefits to companies after implementation and may impact many areas across departmental functions. However, the accounting system is one of the most important foundations for the success of any company, as "the correct and efficient application of the accounting system contributes to enhancing the economic efficiency of the company, reduces the excess costs, and reduces the risks that the company can face" (Kamal, 2015). Therefore, the focus in this research will be to analyze the impacts on accounting functions after emerging technologies are implemented and the operational cost relationships. At the same time, accounting systems still face many obstacles due to poor implementation or delay by accountants (Jasim & Raewf, 2020) while performing their operational activities.

Conventional cost and management accounting practices were criticized for their lack of insight and their inability to support management accounting innovation to cope with the requirements of changing environments (Kamal, 2015). Moreover, the academic literature has been critical of conventional management accounting and control systems, particularly for their lack of efficiency, their inability to present comprehensive and current information, and their inability to assure decision makers and potential users of the quality of such information (Ghandour, 2021; Kamal, 2015).

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The adoption of emerging technologies is no longer avoidable for many companies, and accounting functions are not an exception to this reality. Many researchers have pointed out the benefits derived by companies after emerging technologies are employed in their accounting functions, but no proper focus has been placed on the potential inverse impacts on their operations after the adoption, especially with regard to personnel**,** financial, productivity, procurement, and information technology costs.

Therefore, it is essential to establish a solid and proper integration between the accounting functions and the emerging technologies, which will be referred to in this research as the Enterprise Resource Planning (ERP) systems. Such interactions are required to facilitate and enhance both elements and will lead to the ultimate utilization of the benefits of the employed emerging technologies in companies, the recognition of their positive contributions, and the favorable impacts on overall operational costs.

1.1 The Research Problem

Technologies bring numerous benefits to companies, and efficiencies of operations are continuously improved through the deployment of new technologies that enhance the current processes within overall functions (Estefania et al., 2018). The accounting function is one of the functions that is impacted by such technological implementations (Jasim & Raewf, 2020). However, technologies may add burdens and layers that increase operational costs while performing accounting operations, hence creating drawbacks (Sar & Santoso, 2021).

The current study attempts to answer the general research questions:

- Does the implementation of emerging technologies (ERP systems) in companies affect the operational costs of the accounting functions?
- Does the implementation of emerging technologies (ERP systems) in companies affect the personnel costs, financial cycles, productivity, procurement costs, and information and communication technology costs of the accounting functions?

1.2 Research Hypotheses

In order to assess and validate the impact of the ERP system on the operational costs of the accounting functions, five hypotheses were developed based on the relationship established for the ERP implementation for the objective of this research. Most ERP systems support the accounting functions, as pointed out in Fig. 1, “ERP Finance Module Features.”

The developed hypotheses are listed below.

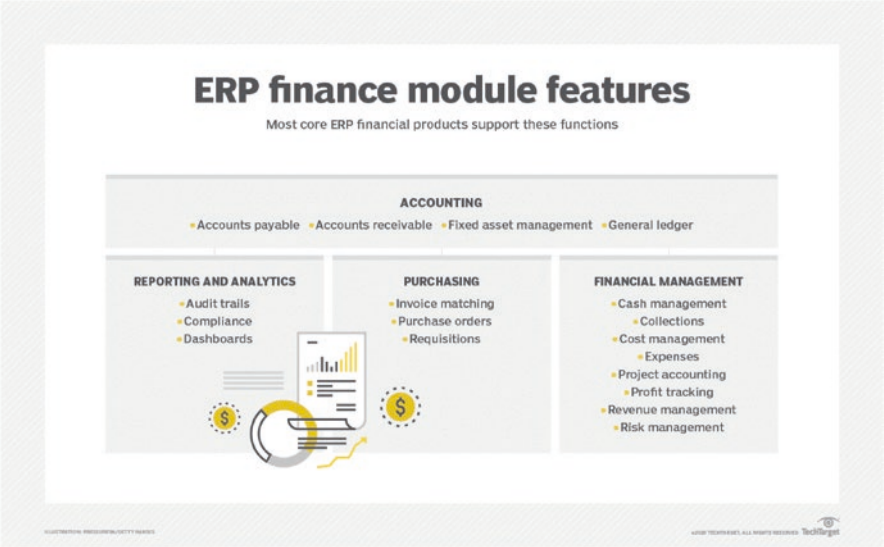

Fig. 1 ERP finance module features. (Source: ERP Finance Module, 2022)

- H_1: There is no impact of emerging technologies on personnel costs of the accounting functions.
- H_2: There is no impact of emerging technologies on the financial cycle of the accounting functions.
- H_3: There is no impact of emerging technologies on the productivity of the accounting functions.
- H_4: There is no impact of emerging technologies on the procurement costs of the accounting functions.
- H_5: There is no impact of emerging technologies on the information and communication technology costs of the accounting functions.

2 Literature Review

This part of the research will begin by defining emerging technologies, accounting functions, operational costs, and ERP systems. Then it will address the related studies that participate in assessing the impacts of ERP systems on the operational costs of the accounting functions.

2.1 Definitions

2.1.1 Emerging Technologies

In order to narrow down the discussion and establish more focus on the research aspects, the emerging technologies in this research will be discussed and explained in the context of technologies incorporated into the ERP systems. The terms emerging technologies and ERP will be used interchangeably since ERP brings the latest technology to companies under one umbrella for its core functions and for the best practices for handling accounting activities.

Rotolo et al. (2015) attempted to define emerging technologies by first defining the context of "emerging" in technology and then identifying the measures of the technological attributes. This ended in their defining five attributes of emerging technologies: (i) radical novelty, (ii) relatively fast growth, (iii) coherence, (iv) prominent impact, and (v) uncertainty and ambiguity. They ultimately defined an emerging technology as "A relatively fast growing and radically novel technology characterized by a certain degree of coherence persisting over time and with the potential to exert a considerable impact on the socio-economic domain(s) that is observed in terms of the composition of actors, institutions and the patterns of interactions among those, along with the associated knowledge production processes" (Rotolo et al. 2015).

Day and Schoemaker (2000) and Srinivasan (2008) state that emerging technologies (ETs) are science-based innovations with the potential to create a new industry or transform an existing one.

To summarize, it is noticeable that there is no apparent unique definition that represents the ultimate meaning of ETs; to some extent, it may change continuously and vary across industries.

2.1.2 Accounting Functions

Accounting has been well known since inception as the recording of economic events that occur within companies over periods of time. The economic events that are registered and tracked through the accounting function ultimately feed into the preparation of the financial statements.

Accounting is a very old discipline; it has existed and has been practiced by companies in various forms for many years (Wood & Sangster, 2007).

According to Wood and Sangster (2007), accounting can be defined as "the process of identifying, measuring, and communicating economic information to permit informed judgments and decisions by users of information." In other words, two main elements can be identified for the accounting function:

1. Process economic information through identifying, measuring, and communicating economic information

2. Provide economic information for decision-making to permit informed judgments and decisions by users of information

The first element is dealt with and managed under financial accounting, while the second element is dealt with and managed under management accounting.

According to Petkov (2020), there are two important elements that should be considered by companies when they are preparing financial statements. The first element is time, because it addresses the necessary time to prepare the financial statements. The second element is human, because it addresses the time needed to make decisions and record economic events.

Companies should consider these main elements before they deploy any ETs in their environments. They should also assure that efficiencies and advancements needed for their reporting in the accounting function are properly achieved by the deployed ETs.

Accounting as a discipline has changed over time, and the need has become more essential for ETs to be introduced into accounting. These advances in digital technology are quickly changing the way we record, store, and manage data, perform audits, and deliver other accounting services (Appelbaum et al., 2017).

On the other hand, researchers realize that changes in ETs are bringing benefits to companies: "As business information is managed by accounting, any change in this sector will have a positive impact on the company, especially in the accounting department" (Jasim & Raewf, 2020).

Most functions within an organization are currently performed by humans. Their jobs are to identify the economic events and properly record them via journal entries in accordance with the established criteria or framework, such as US GAAP or IFRS (Jasim & Raewf, 2020; Petkov, 2020).

Therefore, the assessment in this research will be devoted to examining the impact of the ERP system on the operational costs of the accounting functions. Those functions are accounts payables, accounts receivables, fixed assets management, and general ledger reporting, as shown in Fig. 1, "ERP Finance Module Features," since those areas are considered to be the core features of any ERP system.

2.1.3 Operational Costs

According to the Corporate Finance Institute (CFI), operating expenses refer to the costs incurred by a business while performing its operational activities. This is commonly referred to by businesses as operational expenditure (OPEX).

"In information technology, operational costs document the price of running of IT services on a day-to-day basis. Operational costs may include expenditures for staffing, hardware maintenance, electricity, software procurement, storage rental, and security. Operational costs are usually calculated quarterly or annually" (TechTarget, 2022).

In the context of this research, the focus of the operational costs will be addressed as the functions being operated for the accounting department.

2.1.4 Enterprise Resource Planning (ERP) System

An ERP system integrates several business domains of an organization into one by combining different business strategies with IT-supported solutions (Shtub & Karni, 2010).

Another comprehensive definition noted by Oracle Company covers the related elements of the ERP system; they state that "Enterprise resource planning (ERP) refers to a type of software that organizations use to manage day-to-day business activities such as accounting, procurement, project management, risk management and compliance, and supply chain operations. A complete ERP suite also includes enterprise performance management software that helps plan, budget, predict, and report on an organization's financial results. ERP systems tie together a multitude of business processes and enable the flow of data between them. By collecting an organization's shared transactional data from multiple sources, ERP systems eliminate data duplication and provide data integrity with a single source of truth" (Oracle, 2022).

Additionally, the definition of the ERP system can be expanded to include the aspects of its capability to link and integrate the functions of the organization to ultimately allow the users to access the software through an integrated and unified database (Salmeron & Lopez, 2010).

2.2 Related Studies

Since ERP systems have been adopted globally, numerous published studies are focused on addressing the benefits that are brought to organizations when they implement ERP systems. However, limited studies are devoted to examining the relationship between an ERP system and its impact on the accounting functions and the interlinked benefits. This is noted because most ERP systems are basically equipped with modules that support the operations of the accounting functions.

"When implementing ERP, the company hopes to increase productivity, access through information and company management performance in decision making" (Estefania et al., 2018).

"Not only the benefits can be seen from the implementation of the ERP system, but there is also evidence of project failure in the implementation of the ERP system. Competitively and technically, on the one hand the implementation of an ERP system must still be done, but on the other hand there are high enough costs that must be incurred for the ERP system implementation process. If the implementation of an ERP system is successful, of course this is very significant for the development of company resources" (Sar & Santoso, 2021).

For instance, Shuai et al. (2007) investigated the relationships between the benefits of ERP implementation and the impacts on supply chain management. Their study concludes that ERP implementation can streamline internal business processes to achieve the supply chain performance. They also add that ERP system capabilities improve information accessibility and visibility across the enterprise and allow them to make more effective operational and strategic decisions such as better manpower planning, enhanced inventory control, and radical improvement of on-time delivery.

According to Mohamed (2009), the major benefits of the ERP systems are the unified and automated business processes and functions and up-to-date information. However, there are some major difficulties associated with ERP system implementations. The software is quite expensive and requires intensive personnel training, it can be very complex and difficult to customize to fit the business processes, and centralized data stores could be a security risk (Mohamed, 2009).

A study done by Annamalai and Ramayah (2011) aims to examine the tangible and intangible benefits of the resource planning systems of two famous enterprises (SAP and Oracle). The study concluded that ERP system implementations generate tangible benefits to organizations, and those benefits are revealed in procurement costs, financial cycles, productivity, personnel costs, and information and communication technology (ICT) costs.

Based on the findings of that study, the benefit elements that were achieved by implementing ERP systems will be considered throughout this research as the basis for assessing and analyzing the impact of ERP systems on the operational costs of firms in their accounting functions.

Furthermore, the accounting industry has been tremendously transformed in the past two decades due to the implementation of ERP systems (Kanellou & Spathis, 2013). According to Fig. 1, most common ERP financial systems are equipped with features that support, at minimum, the accounting functions (accounts payables, accounts receivables, fixed assets management, and general ledgers).

In a related article, Essex (2022) explains the key features of ERP systems by stating that the ERP finance module is the main element in every ERP product, since every company needs to have the ability to record and process their financial transactions. Also, it is aimed at automating their basic accounting, invoicing, financial analytics, forecasting, and reporting transactions. Furthermore, he identifies the purchasing and procurement functions as the most commonly used ERP modules.

In another case study done by Matengu and Swami (2011), the National Development Bank was selected to validate the impact of ERP systems and the implementation of such systems in accounting aspects in general and specific terms. For data collection techniques, the researcher used both qualitative and quantitative approaches. A survey method was adopted for the primary data by targeting 60 Oracle users, and the secondary data was collected through books and peer-reviewed articles. The end users of the ERP systems have established a good reliance on the systems for handling and managing their accounting activities because they provide a centralized database, fast access to financial information, and streamlined

management of data as and when deemed necessary. The limitations and drawbacks of the ERP systems in accounting are mainly due to the low budgets allocated during implementation phases of the ERP systems. This, in turn, impacts the required training and utilization of system capabilities by the system users.

In light of this, a study conducted by Kanellou and Spathis (2013) is aimed at investigating the accounting benefits entailed to the end users of ERPs after they adopt the systems. Their study assesses the ERP systems' impacts on accounting information and its practices. This study also examines the observed benefits of the ERP systems from two aspects; they have assessed the ERP accounting benefits in terms of accountants and IT professionals for end-user satisfaction. Accordingly, a group of 271 participants were surveyed from multiple companies in Greece. The results of their study proved that some of the ERP accounting benefits were perceived by companies mainly from the aspect of the accounting processes and not because of their expectations as IT professionals or accountants. The study also identified other factors relative to the cost of the ERP system and the accounting benefits that affect the satisfaction level of ERP users. It illustrates the importance of conducting additional studies in this field to further examine and determine the accounting benefits that result from the implementation of ERP systems and their impacts on satisfaction.

In the context of ERP and organizational changes and for the purpose of examining the implementation of accounting modules in public service organizations that operate in an emerging economy, Hassan and Mouakket (2016) conducted a study to explore the processes of implementing an ERP system by utilizing Laughlin's (1991) model of organizational change. The purpose was to highlight how the implementation of the accounting modules of an ERP system can disrupt the adoption of an organization's modes of thinking and the practices of its members. A case study approach was used, and data were collected from an organization that operates in the United Arab Emirates through interviews, documentary evidence, and personal observation. Together with implementation and customization issues, the study revealed that employees were forced to use the ERP system. As a result, some members have formed absorption groups that question the organizational change due to the accounting-based ERP system.

This study provides further insights to help top management when they are developing organizational change strategies and to address emerging regulations that could affect the implementation of ERP systems in organizations. This lays the foundation for ensuring proper implementation and use of ERP systems.

Considering this era of business globalization and due to the fast advancements in information technologies and communication aspects, as well as the efforts that have been made by accountants to improve the advancements and performance of their accounting processes, a study was done by Bejjar (2017) to review "the impact of the ERP on the performance of the accounting processes." It was based on an empirical study of 103 accountants who are working in the banking sector and who use ERP systems; 50% of the participants in the questionnaire have more than 5

years of experience in their field. The study concludes that the impact of the ERP on the performance of the accounting processes is valid, but it is not significant, and the analyses differ among different levels. Furthermore, it involves cost reductions of processes, results in productivity gains, and improves the quality of services and accountant work. Also, the ERP system provides accurate and timely information that meets the requirements and the needs of the respective accountants and ERP system users.

Of equal importance in the context of advantages and benefits of the ERP system to the respective users, another study was done by Nur and Irfan (2020) to examine the effects of ERP-based accounting information system implementations on users and organizations. The study focused on companies listed on the Indonesian Stock Exchange, and a sample of employees who use ERP accounting information systems were selected to meet the objective of the study. A structured equation modeling technique was used to analyze the gathered data. As a result of the analyzed data, it has been concluded that the implementation of high-quality information systems generates a high quality of information that satisfies the respective users. Furthermore, it contributes to the performance of the organization by improving personal skills.

This raised the implication that organizations may implement high-quality ERP-based accounting information systems to positively impact organizational performance.

3 Research Methodology

3.1 Population and Sample

Before conducting the survey, it was important to identify the targeted population. The purpose of this study is to assess the impact of the ERP system on the operational costs of the accounting functions. Statistics published by Statista Research Department (Schwandt & Jakob, 2022) identified and described the number of enterprises in Bahrain in 2018 by size. The statistics revealed that, out of 92,000 enterprises in Bahrain, approximately 176 and 950 enterprises were considered to be large- and medium-sized businesses, respectively. So, assuming that all of those businesses had adopted the ERP system in their accounting functions, a 10% targeted sample of those businesses would be around 112 companies.

For this research, a questionnaire survey was distributed to multiple companies in the private sector. Appropriate well-known users of the ERP system who are working in the accounting functions and/or who have experienced a role in such accounting functions were selected; 95 responses were subsequently obtained.

Table 1 Reliability of the questionnaire

Factor name	Number of questions	Cronbach's alpha	Conclusion
Personnel	5	0.8480	Reliable
Financial	5	0.8243	Reliable
Productivity	4	0.8325	Reliable
Procurement	4	0.7601	Reliable
ICT	4	0.8989	Reliable
ERP	6	0.7287	Reliable

3.2 Reliability Test

In this study, it is essential that the questionnaire's validity and reliability should be checked. To eliminate the occurrence of unrelated wrong answers, validity must be taken into consideration.

Cronbach's alpha reliability coefficient usually ranges from 0 to 1; a value close to 1.0 indicates a better internal consistency of the variables in the scale. In other words, this indicates that the survey is more reliable. Consequently, a value of Cronbach's alpha greater than 0.7 is acceptable (Khalid et al., 2012). When multiple Likert-type scale questions are used in the questionnaire, this type of statistical test is usually applied (Gliem & Gliem, 2003). Therefore, Cronbach's alpha reliability test will be applied to the six factors of the questionnaire that included Likert-type scale questions. Table 1 presents the results of the conducted statistical reliability test and confirms that all factors are reliable since their Cronbach's alpha values are greater than 0.70.

4 Findings and Analysis

4.1 Data Statistical Description

Descriptive statistics were followed by the researcher in order to measure variables and explain the mean of the dependent and the independent variables. Descriptive statistics are measures of central tendency and variability such as the mean and standard deviation measures. Overall, the mean of all factors is around 4, which specifies that, on average, the mean is close to agreeing. The standard deviation of all factors is between 0.38 and 0.55. Table 2 shows the value of the mean is 3.61 for personnel and the standard deviation is 0.50, while the mean value for financial is 4.19 and the standard deviation is 0.47. The mean value of productivity is 3.92 and the standard deviation is 0.48, whereas for procurement, the mean value is 3.97 and the standard deviation is 0.41. The mean value for ICT is 3.80 and the standard deviation is 0.55; finally, the mean value for ERP is 3.74 and the standard deviation is 0.38 (Table 2).

Table 2 Descriptive statistics

Factor name	*N*	Minimum	Maximum	Mean	Std. deviation
Personnel (DEP)	95	2.4	4.8	3.611	0.4980
Financial (DEP)	95	3.0	5.0	4.189	0.4743
Productivity (DEP)	95	2.8	5.0	3.924	0.4825
Procurement (DEP)	95	3.0	5.0	3.974	0.4101
ICT (DEP)	95	2.5	5.0	3.800	0.5489
ERP (IND)	95	2.7	5.0	3.739	0.3787
Valid *N* (listwise)	95				

4.2 Correlation

Pearson's correlation coefficient was applied by the researcher; it is used to measure the strength of the relationship between two variables (Mcalister et al., 2016). The statistical test will produce values that range between −1.0 and + 1.0. Values below 0 indicate a negative correlation, which means if one value increases, the other value decreases. The statistical results of values that are −0.5 or below indicate that there is a strong negative correlation between the variables. Statistical values above 0 indicate that there is a positive correlation between the variables; therefore, if one value increases, the other value also increases. If the value is 0.5 or greater, there is a strong positive correlation between the variables (Mcalister et al., 2016). Table 3 illustrates the Pearson's correlation coefficients for all variables.

In reference to Table 3, it can be concluded that all tested variables have positive relationships with ERP and are significant at 5%. Furthermore, the tests indicate that there is a positive relationship between ERP and procurement, and the second highest relationship is between ERP and productivity at 0.35. It can also be seen that the strongest relationship is between procurement and financial, with a result of 0.54. Therefore, it can be noted that procurement and productivity are the factors most impacted by the implementation of ERP systems. Furthermore, the review indicates that there is a strong positive relationship between productivity and financial, with a result of 0.53. Procurement and productivity are the next factors, with a result of 0.51, but still considered as a strong positive relationship. Lastly, the lowest value of Pearson's correlation coefficients test in this survey is 0.20, which illustrates the relationship between ICT and personnel, followed by ICT and financial, with a result of 0.24, and between ERP and financial, with a result of 0.29 (Table 3).

4.3 Regression

In order to achieve the objectives of this research, simple linear regressions were used by the researcher to show how strong the relationships are between each independent and dependent variable. This was achieved by testing the impact of the

Table 3 Results of Pearson's correlation

		Personnel	Financial	Productivity	Procurement	ICT	ERP
Personnel	Pearson correlation	1	0.503**	0.493**	0.488**	0.197	0.323**
	Sig. (2-tailed)		0.000	0.000	0.000	0.056	0.001
	N	95	95	95	95	95	95
Financial	Pearson correlation	0.503**	1	0.533**	0.535**	0.239*	0.291**
	Sig. (2-tailed)	0.000		0.000	0.000	0.020	0.004
	N	95	95	95	95	95	95
Productivity	Pearson correlation	0.493**	0.533**	1	0.514**	0.298**	0.351**
	Sig. (2-tailed)	0.000	0.000		0.000	0.003	0.000
	N	95	95	95	95	95	95
Procurement	Pearson correlation	0.488**	0.535**	0.514**	1	0.458**	0.420**
	Sig. (2-tailed)	0.000	0.000	0.000		0.000	0.000
	N	95	95	95	95	95	95
ICT	Pearson correlation	0.197	0.239*	0.298**	0.458**	1	0.217*
	Sig. (2-tailed)	0.056	0.020	0.003	0.000		0.035
	N	95	95	95	95	95	95
ERP	Pearson correlation	0.323**	0.291**	0.351**	0.420**	0.217*	1
	Sig. (2-tailed)	0.001	0.004	0.000	0.000	0.035	
	N	95	95	95	95	95	95

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

independent variable (ERP) on the dependent variables (personnel, financial, productivity, procurement, and ICT).

The results of the simple linear regressions are presented and illustrated in the following sections for each variable.

4.3.1 Impact of ERP on Personnel (Model 1)

The value of *R* square is 0.104, which indicates that 10.4% of the variation in the dependent variable can be explained by the independent variable. In other words, the impact on personnel that can be explained through ERP represents 10.4%. The standard error of the estimate is 0.4738. The statistics and summary data are shown in Table 4.

Table 4 Model summary – Model (1)

Model	*R*	*R* square	Adjusted *R* square	Std. error of the estimate
1	0.323[a]	0.104	0.095	0.4738

[a]Predictors: (Constant), ERP

Table 5 ANOVA – Model (1)

Model		Sum of squares	df	Mean square	*F*	Sig.
1	Regression	2.434	1	2.434	10.843	.001[a]
	Residual	20.876	93	0.224		
	Total	23.309	94			

[a]Predictors: (Constant), ERP

The informational statistics on the significance of the model are presented in Table 5 with F statistic value of 10.84. This suggests that at least one of the variables is significant at the 1% level. Furthermore, the analysis of variance statistical test (ANOVA) indicates that the model is good (Table 5).

The values of the t-statistic are significant at 1% for personnel. Thus, the change in personnel can be explained by the implementation of ERP.

According to Kline (2005), "the regression coefficients of a value less than 0.10 could indicate a small effect; values about 0.30 could indicate a medium effect; and values more than 0.50 indicate a large effect." In this context, Model 1 shows that the coefficient $\beta = 0.425$, which indicates that ERP has a medium impact on personnel. Accordingly, there is evidence that the implementation of ERP does affect personnel costs in the accounting functions, so we reject the null hypothesis that states that ETs do not affect personnel costs of the accounting functions. This result is consistent with the studies (Annamalai & Ramayah, 2011; Petkov, 2020) (Table 6).

4.3.2 Impact of ERP on Financial (Model 2)

The value of *R* square is 0.084, which indicates that 8.4% of the variation in the dependent variable can be explained by the independent variable. In other words, the impact on financial that can be explained through ERP represents 8.4%. The standard error of the estimate is 0.4563. The statistics and summary data are shown in Table 7.

The informational statistics on the significance of the model are presented in Table 8 with *F* statistic value of 8.57. This suggests that at least one of the variables is significant at the 1% level. Furthermore, the analysis of variance statistical test (ANOVA) indicates that the model is good (Table 8).

The values of the t-statistic are significant at 1% for financial. Thus, the change in personnel can be explained by the implementation of ERP. Model 2 shows that

Table 6 Regression coefficients – Model (1)

Model		Unstandardized coefficients		Standardized coefficients		
		B	Std. error	Beta	*t*	Sig.
1	(Constant)	2.022	0.485		4.170	0.000
	ERP	0.425	0.129	0.323	3.293	0.001

Table 7 Model summary – Model (2)

Model	*R*	*R* square	Adjusted *R* square	Std. error of the estimate
1	0.291[a]	0.084	0.075	0.4563

[a]Predictors: (Constant), ERP

Table 8 ANOVA – Model (2)

Model		Sum of squares	df	Mean square	*F*	Sig.
1	Regression	1.785	1	1.785	8.572	0.004[a]
	Residual	19.365	93	0.208		
	Total	21.149	94			

[a]Predictors: (Constant), ERP

Table 9 Regression coefficients – Model (2)

Model		Unstandardized coefficients		Standardized coefficients		
		B	Std. error	Beta	*t*	Sig.
1	(Constant)	2.829	0.467		6.058	0.000
	ERP	0.364	0.124	0.291	2.928	0.004

the coefficient $\beta = 0.364$, which indicates that ERP has a medium impact on the financial cycle according to Kline's (2005) ranking. Accordingly, there is evidence that the implementation of ERP does affect the financial cycle in the accounting functions, so we reject the null hypothesis that states that ETs do not affect the financial cycle of the accounting functions. This result is consistent with the studies discussed in the literature review chapter, i.e., Appelbaum et al. (2017) and Jasim and Raewf (2020) (Table 9).

4.3.3 Impact of ERP on Productivity (Model 3)

The value of *R* square is 0.123, which indicates that 12.3% of the variation in the dependent variable can be explained by the independent variable. In other words, the impact on productivity that can be explained through ERP represents 12.3%.

Table 10 Model summary – Model (3)

Model	*R*	*R* square	Adjusted *R* square	Std. error of the estimate
1	0.351[a]	0.123	0.113	0.4543

[a]Predictors: (Constant), ERP

Table 11 ANOVA – Model (3)

Model		Sum of squares	df	Mean square	*F*	Sig.
1	Regression	2.690	1	2.690	13.032	0.000[a]
	Residual	19.195	93	0.206		
	Total	21.884	94			

[a]Predictors: (Constant), ERP

Table 12 Regression coefficients – Model (3)

Model		Unstandardized coefficients		Standardized coefficients	*t*	Sig.
		B	Std. error	Beta		
1	(Constant)	2.254	0.465		4.847	0.000
	ERP	0.447	0.124	0.351	3.610	0.000

The standard error of the estimate is 0.4543. The statistics and summary data are shown in Table 10.

The informational statistics on the significance of the model are presented in Table 11 with F statistic value of 13.03. This suggests that at least one of the variables is significant at the 1% level. Furthermore, the analysis of variance statistical test (ANOVA) indicates that the model is good (Table 11).

The values of the t-statistic are significant at 1% for productivity. Thus, the change in personnel can be explained by the implementation of ERP. Model 3 shows that the coefficient $\beta = 0.447$, which indicates that ERP has a medium impact on productivity according to Kline's (2005) ranking. Accordingly, there is evidence that implementation of ERP does affect productivity in the accounting functions, so we reject the null hypothesis that states that ETs do not affect productivity of the accounting functions. This result is consistent with the studies explained in the literature review chapter and more specifically in the study by Estefania et al. (2018) (Table 12).

4.3.4 Impact of ERP on Procurement (Model 4)

The value of *R* square is 0.177, which indicates that 17.7% of the variation in the dependent variable can be explained by the independent variable. In other words, the impact on procurement that can be explained through ERP represents 17.7%.

Table 13 Model summary – Model (4)

Model	*R*	*R* square	Adjusted *R* square	Std. error of the estimate
1	0.420[a]	0.177	0.168	0.3741

[a]Predictors: (Constant), ERP

Table 14 ANOVA – Model (4)

Model		Sum of squares	df	Mean square	*F*	Sig.
1	Regression	2.795	1	2.795	19.972	0.000[a]
	Residual	13.014	93	0.140		
	Total	15.809	94			

[a]Predictors: (Constant), ERP

Table 15 Regression coefficients – Model (4)

Model		Unstandardized coefficients		Standardized coefficients	*t*	Sig.
		B	Std. error	Beta		
1	(Constant)	2.271	0.383		5.933	0.000
	ERP	0.455	0.102	0.420	4.469	0.000

The standard error of the estimate is 0.3741. The statistics and summary data are shown in Table 13.

The informational statistics on the significance of the model are presented in Table 14 with F statistic value of 19.97. This suggests that at least one of the variables is significant at the 1% level. Furthermore, the analysis of variance statistical test (ANOVA) indicates that the model is good (Table 14).

The values of the t-statistic are significant at 1% for procurement. Thus, the change in procurement can be explained by the implementation of ERP. Model 4 shows that the coefficient $\beta = 0.455$, which indicates that ERP has a medium impact on procurement according to Kline's (2005) ranking. Accordingly, there is evidence that implementation of ERP does affect procurement costs in the accounting functions, so we reject the null hypothesis that states that ETs do not affect procurement costs of the accounting functions. This result aligns with the studies illustrated under the literature review chapter, i.e., Shuai et al. (2007) and Annamalai and Ramayah (2011) (Table 15).

4.3.5 Impact of ERP on ICT (Model 5)

The value of *R* square is 0.047, which indicates that 4.7% of the variation in the dependent variable can be explained by the independent variable. In other words, the impact on ICT that can be explained through ERP represents 4.7%. The standard error of the estimate is 0.5387. The statistics and summary data are shown in Table 16.

Table 16 Model summary – Model (5)

Model	*R*	*R* square	Adjusted *R* square	Std. error of the estimate
1	0.217[a]	0.047	0.037	0.5387

[a]Predictors: (Constant), ERP

Table 17 ANOVA – Model (5)

Model		Sum of squares	df	Mean square	*F*	Sig.
1	Regression	1.335	1	1.335	4.599	0.035[a]
	Residual	26.990	93	0.290		
	Total	28.325	94			

[a]Predictors: (Constant), ERP

Table 18 Regression coefficients – Model (5)

Model		Unstandardized coefficients		Standardized coefficients		
		B	Std. error	Beta	*t*	Sig.
1	(Constant)	2.624	0.551		4.759	0.000
	ERP	0.315	0.147	0.217	2.144	0.035

The informational statistics on the significance of the model are presented in Table 17 with F statistic value of 4.60. This suggests that at least one of the variables is significant at the 1% level. Furthermore, the analysis of variance statistical test (ANOVA) indicates that the model is good (Table 17).

The values of the t-statistic are significant at 1% for personnel. Thus, the change in ICT can be explained by the implementation of ERP. Model 5 shows that the coefficient $\beta = 0.315$, which indicates that ERP has a medium impact on ICT according to Kline's (2005) ranking. Accordingly, there is evidence that implementation of ERP does affect ICT costs in the accounting functions, so we reject the null hypothesis that states that ETs do not affect ICT costs of the accounting functions. This result is consistent with the major studies explained under the literature review, such as Sar and Santoso (2021) and Appelbaum et al. (2017) (Table 18).

5 Conclusion and Recommendation

5.1 Conclusion

The findings of this research were basically built to test the impact of the ERP system on five sub-factors: personnel costs, financial cycles, productivity, procurement costs, and information and communication technology costs. The impact is then further formulated on the main factor (operational costs).

The purpose for testing those factors is to validate and quantify the impact that is brought into companies upon implementing ERP systems, since the providers of such systems promise companies that essential benefits will be noticed in their environments. The impact on reducing the operational costs is not an exception to those benefits. The researcher chose this topic due to his involvement with three implementation teams that implemented ERP systems in private sector companies. Ultimately, based on the primary data gathered through the distributed questionnaire, the results of this research could be generalized across the population.

In this research, the researcher analyzed the data that were collected through the responses to the circulated questionnaire. Based on the analysis, the researcher concludes that the operational costs of all of the considered sub-factors are impacted by the ERP system. Those factors are personnel costs, financial cycles, productivity, procurement costs, and information and communication technology costs, and those factors cumulatively impact the operational costs of the accounting functions. The reliability level of the outcomes was measured through Cronbach's alpha. All tested factors have positive correlations with the ERP, and the correlation values are between 0.20 and 0.54, so this suggests that implementation of ERP systems affects the operational costs of the accounting functions. Regression results reveal that procurement is the factor most impacted by the implementation of the ERP, with a value of 0.455, then productivity, with a value of 0.447. ICT is the factor that is least impacted by the ERP, with a value of 0.315. As a result, there is evidence that implementation of ERPs does affect personnel costs, financial cycles, productivity, procurement costs, and information and communication technology costs in the accounting functions, so we reject the null hypothesis that states that ETs have no impact on all sub factors. The results are consistent with most of the related studies demonstrated under the literature review.

5.2 Recommendations

The following are recommendations based on the research findings. First, users of ERP systems should be trained extensively to grasp the ultimate beneficial impact of the ERP system on operational costs. Furthermore, attention should be allocated to other factors that impact the operational costs of the accounting functions. Finally, the benefits that were promised before the implementation of the ERP system should be assessed regularly after implementation to ensure the existence of such benefits, consider any required improvements, and resolve any issues encountered.

References

Annamalai, C., & Ramayah, T. (2011). Enterprise Resource Planning (ERP) benefits survey of Indian manufacturing firms: An empirical analysis of SAP versus Oracle package. *Business Process Management Journal, 17*(3), 495–509.

Appelbaum, D., Kogan, A., & Vasarhelyi, M. A. (2017). Big data and analytics in the modern audit engagement: Research needs. *A Journal of Practice & Theory, 36*(4), 1–27.

Bejjar, M. A. (2017). The impact of Enterprise Resource Planning (ERP) on the performance of accounting processes. *International Journal of Information Technology & Management Information System, 8*(1), 22–39.

Day, G. S., & Schoemaker, P. (2000). Avoiding the pitfalls of emerging technologies. *California Management Review, 42*(2), 8–33.

ERP Finance Module. (2022, June 1). Retrieved from Techtarget: https://www.techtarget.com/searcherp/definition/ERP-finance-module

Essex, D. (2022, June 1). *The_Ultimate_Guide_to_ERP.pdf*. Retrieved from Techtarget: https://media.techtarget.com/digitalguide/images/Misc/EA-Marketing/Eguides/The_Ultimate_Guide_to_ERP.pdf

Estefania, T. V., Samir, L., Robert, P., Patrice, D., & Alexandre, M. (2018). The integration of ERP and inter-intra organizational information systems: A literature review. *IFAC PapersOnLine, 51*(11), 1212–1217.

Ghandour, D. (2021). Analytical review of the current and future directions of management accounting and control systems. *European Journal of Accounting, Auditing and Finance Research, 9*(3), 42–73.

Gliem, J. A., & Gliem, R. R. (2003). Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales. In *Midwest research to practice conference in adult, continuing, and community education, Columbus* (pp. 82–88).

Hassan, M., & Mouakket, S. (2016). ERP and organizational change: A case study examining the implementation of accounting modules. *International Journal of Organizational Analysis, 24*(3), 487–515.

Jasim, Y., & Raewf, M. (2020). Information Technology's impact on the accounting system. *Cihan University-Erbil Journal of Humanities and Social Sciences, 4*(1), 50–57.

Kamal, S. (2015). Historical evolution of management accounting. *The Cost and Management, 43*(4).

Kanellou, A., & Spathis, C. (2013). Accounting benefits and satisfaction in an ERP environment. *International Journal of Accounting Information Systems, 14*(3), 209–234.

Khalid, K., Hilman, H., & Kumar, D. (2012). Get along with quantitative research process. *International Journal of Research in Management, 2*(2), 15–29.

Kline, T. (2005). *Psychological testing: A practical approach to design and evaluation*. Sage Publications, Inc..

Laughlin, R. C. (1991). Environmental disturbances and organizational transitions and transformations: Some alternative models. *Organization Studies, 12*(2), 209–232.

Matengu, K., & Swami, B. (2011). Impact of Enterprise Resource Planning (ERP) in accounting systems: A case study. *International Journal of Management & Business Studies, 1*(3).

Mcalister, C., Schmitter-Edgecombe, M., & Lamb, R. (2016). Examination of variables that may affect the relationship between cognition and functional status in individuals with mild cognitive impairment: A meta-analysis. *Archives of Clinical Neuropsychology, 31*(2), 123–147.

Mohamed, A. (2009, July 23). *Enterprise Resource Planning (ERP) software suppliers – Essential Guide*. Retrieved from Computerweekly: https://www.computerweekly.com/feature/Enterprise-Resource-Planning-ERP-software-suppliers-Essential-Guide

Nur, E. D., & Irfan, M. (2020). ERP-based accounting information system implementation in organization: A study in Riau, Indonesia. *The Journal of Asian Finance, Economics and Business, 7*(12), 147–157.

Oracle. (2022, June 1). *What-Is-ERP*. Retrieved from Oracle: https://www.oracle.com/erp/what-is-erp/

Petkov, R. (2020). Artificial intelligence (AI) and the accounting function – A revisit and a new perspective for developing framework. *Journal of Emerging Technologies in Accounting*, 99–10.

Rotolo, D., Hicks, D., & Martin, B. (2015). What is an emerging technology? *Research Policy, 44*(10), 1827–1843.

Salmeron, J., & Lopez, C. (2010). A multicriteria approach for risks assessment in ERP maintenance. *Journal of Systems and Software, 83*(10), 1941–1953.

Sar, M. W., & Santoso, B. (2021). Analysis of Enterprise Resource Planning (ERP) system implementation for manufacturing in Indonesia. *Journal of Physics: Conference Series, 1823*(1), 012116.

Schwandt, F., & Jakob, H. (2022, June 1). Statistics/943018/Bahrain-number-of-enterprises-by-size. Retrieved from Statista Research Department Web Site: https://www.statista.com/statistics/943018/bahrain-number-of-enterprises-by-size/

Shtub, A., & Karni, R. (2010). *The dynamics of supply chain and process management* (2nd ed.). Springer.

Shuai, J., Su, F., & Yang, C. (2007). *The impact of ERP implementation on corporate supply chain performance* (pp. 1644–1648). Institute of Electrical and Electronics Engineers (IEEE).

Srinivasan, R. (2008). Characteristics and effects of emerging technologies: Research opportunities in innovation. *Industrial Marketing Management, 37*, 633–640.

TechTarget. (2022, June 1). *Operational-Costs*. Retrieved from TechTarget: https://www.techtarget.com/whatis/definition/operational-costs

Wood, F., & Sangster, A. (2007). *Business accounting* (10th ed.). Financial Times/Prentice Hall.