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Towards Integrated Management Accounting System for Measuring Environmental Performance

Suhail Abdullah Al-Tamimi
Department of Accounting, College of Administration & Economics, University of Basrah, Basrah, Iraq
Email: suh2001971@yahoo.com

The study's primary purpose was to assess whether integrating various IT capabilities into the integrated management accounting system has a favorable effect on environmental performance. Many corporations in the oil and gas industry have experienced environmental conservation difficulties that have led to lawsuits. In most instances, these individuals were unaware of the environmental consequences of their decisions until the hazards materialized. The management accounting system facilitates informed decision-making and enables businesses to meet environmental goals. Therefore, the purpose of the present study was to collect data from Iraq's oil and gas industry to examine how integrated managerial accounting systems might lead to improved environmental performance in enterprises by leveraging IT infrastructure and capabilities. Three hundred and twenty-three respondents were surveyed for the quantitative study. Amos was used to conducting structural equation modeling on the data. The research found that both the direct and indirect effects were positive and substantial. This suggests that using integrative technology and management accounting systems in the oil and gas business can lead to Environmental Conservation. Numerous literary and practical merits of the study have been explored. In addition, the limitations and prospects of the study are discussed.

Key words: Integrated management accounting system, environmental performance, IT infrastructure, Productivity.

1. INTRODUCTION

The environment is an essential part of the corporate world. A company's success or failure can be determined by its environmental practices. The senior management must make informed judgments that positively influence the environment during the decision-making process. A wise judgment must consider all environmental effects of the topic at hand. Oil and gas firms are among the industries most impacted by environmental issues. These businesses must comply with environmental management and conservation regulations. In addition, businesses must cut expenses by making prudent judgments to enhance their reputation (Falih Chichan et al., 2021). Environmental exploitation has presented numerous oil and gas corporations with obstacles, including lawsuits and reputational damage. Therefore, businesses must be careful when making every day operational decisions.

Environmentally responsible decision-making is a process that must be followed to attain desirable outcomes (Jovanović et al., 2022). Data gathering, review, and analysis are elements of the decision-making process. This study examines a method that will enable managers and employees to make quick decisions and monitor environmental performance without encountering numerous obstacles. The study focuses on the Janwa Group in Iraq and is conducted via questionnaires. Several papers were analyzed to offer more light on the subject of the investigation. The paper will conclude with recommendations for future research areas that should be prioritized to achieve high environmental performance. Many businesses wish to be perceived as environmentally friendly for their reputation and to avoid violating Environment Management rules. Measuring environmental performance during decision-making is difficult (Asiaei et al., 2022). It is because the environmental effects of most decisions may not be felt until years later. It is challenging to make ecologically responsible judgments without a good framework to evaluate environmental considerations and hazards. The management accounting system is designed to assist firms in making sound judgments on all daily operations tasks (Jovanović et al., 2022). The system provides documents and reports that assist businesses in making decisions based on internal considerations. Environmental performance is evaluated based on internal activities and their external influence. An integrated management accounting system will assist the firm in optimizing its environmental performance-maintenance decisions.

In recent decades, Iraq has witnessed substantial climate change (Azooz et al., 2015). The country's temperature has risen dramatically in a short time. Iraq is believed to contain one of the world's most significant oil reserves. Thus, the extraction, processing, and consumption of oils and fossil fuels contribute to environmental damage and global warming. The nation and the world suffer the consequences of such practices (Nasiritousi, 2017). Therefore, the nation's oil corporations must improve their business methods and lessen their negative impact on the global environment. However, it is fairly difficult for oil businesses to attain these results, given that they deal with

the resource that is one of the leading causes of climate change. Using its management accounting systems, the business can gather information on sustainable practices and their implementation to address the issue. They can utilize the data to improve their environmental performance. The IT infrastructure is renowned for facilitating the rapid acquisition of knowledge and implementing organizational procedures.

Consequently, this study will investigate the effect of management accounting systems on environmental performance by examining the role of IT infrastructure flexibility and IT business alignment as mediators. Most previous research has been conducted in western culture, restricting the study's applicability. In addition, relatively few researchers have studied the unique framework containing all of these components (Antoni et al., 2020; Christine, 2019; Egbunike et al., 2014; Fuzi et al., 2016). Further research is required to broaden the approach's applicability to other contexts, such as Iraq. There have been questions about the effectiveness of the integrated management accounting system. The primary objective of this article is to determine how effective the management accounting system is at assessing environmental performance. By making wise choices, a corporation can protect itself from the negative repercussions of insufficient environmental conservation (Deb et al., 2022). In light of this, the purpose of this article is to demonstrate the necessity for an integrated management accounting system for environmental performance. The report also intends to demonstrate the environmental benefits of deploying IT-enabled solutions, particularly for oil industries. As Janwa Group falls under the oil and gas business category, it is this study's subject. This study aims to demonstrate the necessity of integrating management accounting systems for monitoring environmental performance. The following are the research questions for the current study.

1. How does the integrated management accounting system impact a firm's environmental performance?
2. What is the mediation effect of IT technical infrastructure flexibility between an integrated management accounting system and a firm's environmental performance?
3. What is the mediation effect of IT Business Alignment between an integrated management accounting system and a firm's environmental performance?

The report is essential for businesses seeking to enhance their environmental performance. In recent years, environmental concerns have been cited as one of the primary reasons why corporations are losing customers and market value. Using the management accounting system, corporations can prevent losses due to environmental exploitation as technology advances (Deb et al., 2022). The system focuses on the influence of internal causes on external environmental consequences. Therefore, the study is crucial for businesses that wish to enhance their operations by enhancing their services using technological means. It is also vital to highlight that most businesses do not understand how the accounting system operates. This article explains how businesses can use the management accounting system to enhance their operations and decision-making.

In addition, the work is useful for future scholars who focus on the difficulties of employing technology to address environmental issues. This research article fills a void by demonstrating the importance of integrating environmental performance measurements into the management accounting system. Future scholars will profit from the publication because it will serve as a foundation for their studies. The study will also include recommendations for areas where future academics can and should concentrate their efforts on enhancing decision-making technologies.

2. LITERATURE REVIEW

1.1 Environmental Performance

According to Falih Chichan et al. (2021), environmental performance gauges the accomplishment of an organization's environmental goals. Companies must comply with environmental management compliance rules and regulations. Consequently, organizations establish goals and objectives that facilitate compliance with these rules. A company's environmental performance reveals the extent to which it has achieved its objective, which is to operate in an environmentally responsible manner.

Several factors influence organizational environmental performance. As staff expects to follow their leaders' directives, poor management substantially influences environmental performance. Effective management guarantees that appropriate decisions are made. Effective leaders identify environmental issues and devise methods to address them (Mayndarto et al., 2021). It becomes impossible to maintain high environmental performance without adequate management. Another component influencing environmental performance is technology. For the majority of businesses, technology has enhanced their operational efficiency. However, technology can be a disguised boon. Some technological advancements have significant detrimental effects on the environmental side of businesses (Gunarathne et al., 2021). The advancements prevent businesses from achieving their environmental goals and objectives. However, several technologies assist businesses in tracking their environmental progress. The technologies assist them in making well-informed decisions to mitigate environmental concerns.

Additionally, ignorance and carelessness contribute to environmental performance. Environmental conservation is a team effort in that all employees must participate (Falih Chichan et al., 2021). Only firms with all employees who are accountable and make well-informed decisions that benefit the environment will exhibit high performance. However, some businesses are uneducated and careless regarding environmental rules and minor behaviors contributing to the progressive degeneration of the

environment.

Environmental performance measurement allows a business to track its progress. When designing organizational plans, businesses must consider the environmental goals they wish to achieve within a specified time frame. Through measuring environmental performance, the company will know what movements it should make to attain its environmental objectives (Mayndarto et al., 2021). The purpose of monitoring environmental performance is to guarantee that an organization does not lose sight of its environmental goal. Measuring performance will also help organizations pinpoint areas where they have relaxed. Organizations must investigate all areas that could affect their environmental objectives and ensure they account for them. Measuring environmental performance helps find potential for cost savings. There are expensive choices that can be avoided by embracing environmentally friendly alternatives. According to Deb et al. (2022) choices can be easily discovered if a company has a track illustrating how these events are related and how to avoid making expensive judgments. For instance, when a business notices that its performance is deteriorating owing to nonrenewable energy, it may seek out renewable energy sources. Additionally, the organization can direct resources to locations with high energy demands and regulate energy changes to prevent excessive, useless usage.

1.2 Theoretical Background: Environmental Sustainability through Diffusion of Innovation Theory

The diffusion of innovation theory can be used to explain the conceptual framework of the present study. According to the theory, spreading innovation entails the gradual dissemination of innovation through specialized channels among the participants of a social system. Consequently, it is a mechanism that spreads innovation from its discovery source to its adaptor. This process occurs in space as a collaborative endeavor. It must fit within the innovation category, be conveyed via particular channels, be accepted by members of a social system, and account for the duration of the time element (Sahin, 2006). First, sustainability can be viewed as an innovative practice that progressively spreads throughout society as individuals adopt the concept. As it progressively spread among community members and companies, they began to adopt it (Dibra, 2015). In the current study, the researcher hypothesized that the objective of sustainability could be attained by a flexible infrastructure and the incorporation of IT into the business via the management accounting system. According to the researcher, sustainability has propagated and reached the user, the organization in this example, through management accounting systems. Afterward, the organization's members embrace it via the technological infrastructure and flexibility integrated into company operations. The technological infrastructure and its adaptability facilitate the organizations and its members embrace of the concept of sustainability. The management accounting system facilitates the dissemination of ideas by providing information to the organization's members. Throughout time, businesses incorporate and embrace essential change through organizational behavior. In this case, "change" refers to sustainable practices for improved sustainability. (Khan et al., 2022; Mustonen-Ollila et al., 2003; Sartipi, 2020).

1.3 Integrated Management Accounting System and Environmental Performance

By handling information from several external and internal sources in an up-to-date, efficient, and structured manner, the management information system can assist management and decision-makers in reducing the extent of existing environmental problems. Consequently, by providing managers with the essential supporting data at the appropriate time, an organization's effective utilization management information system can help reduce external anomalies' impact on improving management's knowledge of environmental dynamics. Similar to how corporations are contemplating the relevance of energy management to lessen their reliance on energy consumption or employ renewable, environmentally friendly energy sources to meet their energy needs (Adusei, 2018; Alaeddin et al., 2018). Thus, the enterprises will be able to meet the needs of their customers by employing sustainable production methods, limiting environmental pressures, and adhering to national and international regulations. Thus, it can be inferred that the management accounting system aims to identify the carbon consumption of businesses and provide information regarding the need to implement energy optimization (Alaeddin, 2019; Fuzi et al., 2016). Consequently, a management accounting system can help businesses widen their approach to embracing environmental quality and improve their environmental performance. Integrating environmental accounting into management accounting systems can help businesses profit from rising ecological demands and opportunities to improve environmental practices through efficient accounting information processes. It also facilitates business decisions by collecting pertinent information regarding an organization's reliance on energy and its contribution to harmful carbon emissions resulting from energy consumption (Asiaei et al., 2022; Haseeb et al., 2019).

Organizations can adjust to this condition of uncertainty by building and implementing cutting-edge management systems that continually account for the rising complexity of the business world and monitor the organization's internal responses to this complexity. The need to incorporate qualitative information from the company's functional environment to ensure the successful execution of the company's strategy led to the development of strategic management accounting approaches. The management accounting systems that are strategically positioned in acquiring and delivering the necessary data to managers would facilitate the intake and use of all such

data for holistic management of performance among the three components, as sustainability is a multidimensional concept requiring effectiveness in all three components: social, economic, and environmental (Christine, 2019; Egbunike et al., 2014). Management's emphasis on environmental issues fuels the company's capacity to establish a corporate sustainability strategy. By basing their proactive strategies on environmental performance indicators, companies with proactive strategies improve their environmental performance. Every organization must have a corporate sustainability strategy to boost its sustainability (Latan et al., 2018).

H1: Traditional MAS has a significant impact on a firm's environmental performance

H2: Strategic MAS has a significant impact on a firm's environmental performance

1.4 Mediation of IT-Environmental Management Integration

Integrating information technology into environmental management procedures can improve their sustainability performance. The environmental focus of a company enhances the effect of information technology proficiency on this incorporation. Information technology can alter business procedures and capacity to pursue environmental management and sustainability. Integrating IT into environmental management processes is a complementary capability that describes how well an organization integrates and employs IT to modify environmental management processes. This change based on information technology suggests that the company's environmental management systems will be broadened, improved, made more efficient, and easily modified. The alteration of environmental management procedures using IT can affect these systems' expansion, improvement, adaptability, and efficiency to improve environmental performance (Wang et al., 2015). According to Schniederjans et al. (2016), improving environmental performance requires adding environmental factors into standard product development and production processes, which increases the complexity of decisions and processes. Advanced technologies can provide effective solutions for environmentally friendly product design, manufacturing, and maintenance methods that limit the use of natural resources and harmful pollutants over the product's lifetime. Additionally, via the use of technology, the process of gathering and analyzing data to optimize the use of energy, control the quality of water and air, and manage metals can be improved (Antoni et al., 2020; Junior et al., 2018; Li et al., 2020). Therefore, when firms adopt a comprehensive externally oriented management accounting system that is driven by strategy and provides financial and non-financial data that can assist the management in developing and tracking the firm's strategy efficiently, they can use their IT infrastructure to convert the information into an improved and more effective overall performance.

In addition, an efficient strategic management accounting system incorporates competitor information that can help the firm obtain a competitive advantage. Through the employment of IT infrastructure and a management accounting system, the organization can examine how its competitors are implementing sustainable business practices using IT infrastructure and IT integration, enhancing its overall performance (Ojra et al., 2021). IT infrastructure is a firm's fundamental capability since it facilitates the organization's ability to modify business processes and adapt quickly to opportunities and risks in the environment. They can expedite access to new information from the external world, allowing the firm to adjust quickly to shifting client preferences and trends. Consequently, the firm can enhance its competitive edge and performance by adopting trends quickly. Flexible infrastructure facilitates incorporating sustainability practices into corporate activities, improving environmental performance (Hou, 2020). Before management can make any judgments, a large amount of data must be gathered and processed due to the new, fast-changing business environment. The relationship between management accounting systems and information technology is pertinent (Pervan et al., 2019). As a result, most businesses adopt integrated information systems to support management accounting systems. Implementing and aligning the Management information system is crucial since it provides managers and staff with vital information for making educated decisions. Many aspects and risks are considered when an organization considers introducing technical modifications to a system. The employees' lack of training and proficiency with the new technologies and linked systems is a factor. The pertinent information is required to construct the course for this purpose. Training personnel and enhancing their abilities necessitate information that aids in their comprehension of the new system and its use. Information is provided by the management accounting system, which might affect the integration and flexibility of IT infrastructure. The organization becomes more competent as people become trained and skilled in the product.

An efficient management system can positively influence managers' actions, resulting in improved technological change implementation decisions (Pedroso et al., 2020). Research indicates that the integrated, collective, timely, and broader scope information provided by management accounting systems, including qualitative, quantitative, internal, and external information, is essential for the planning, monitoring, and controlling required for the integration and use of an advanced design. Consequently, when a manager, with the aid of data, chooses better choices and orients toward better judgments by assuming the position of an effective manager, the organization's performance improves. Their performance contributes to the organization's improved performance (Ismail et al., 2018).

H3: IT technical Infrastructure Flexibility mediates the relationship between Traditional MAS and the firm's environmental performance

H4: IT technical Infrastructure Flexibility mediates the relationship between strategic MAS and the firm's environmental performance

H5: IT Business Alignment mediates the relationship between Traditional MAS and the firm's environmental performance

H6: IT Business Alignment mediates the relationship between strategic MAS and the firm's environmental performance

3. RESEARCH MODEL

The developed framework explains the link between the studied constructs. The design is predicated on the hypothesis stated in this chapter. These are constructed by evaluating prior studies to determine the relationship between variables. The relevant studies and literature have been discussed in the past to explain the link between the variables in support of the research framework and objective. Therefore, the framework is created based on the investigations. The model indicates that in the study, traditional management accounting systems and strategic management accounting systems are independent variables that, presumably, can influence the firm's environmental performance, which is the dependent variable, through the mediation of IT technical infrastructure flexibility and IT business alignment, which are the mediating variables in the current research study.

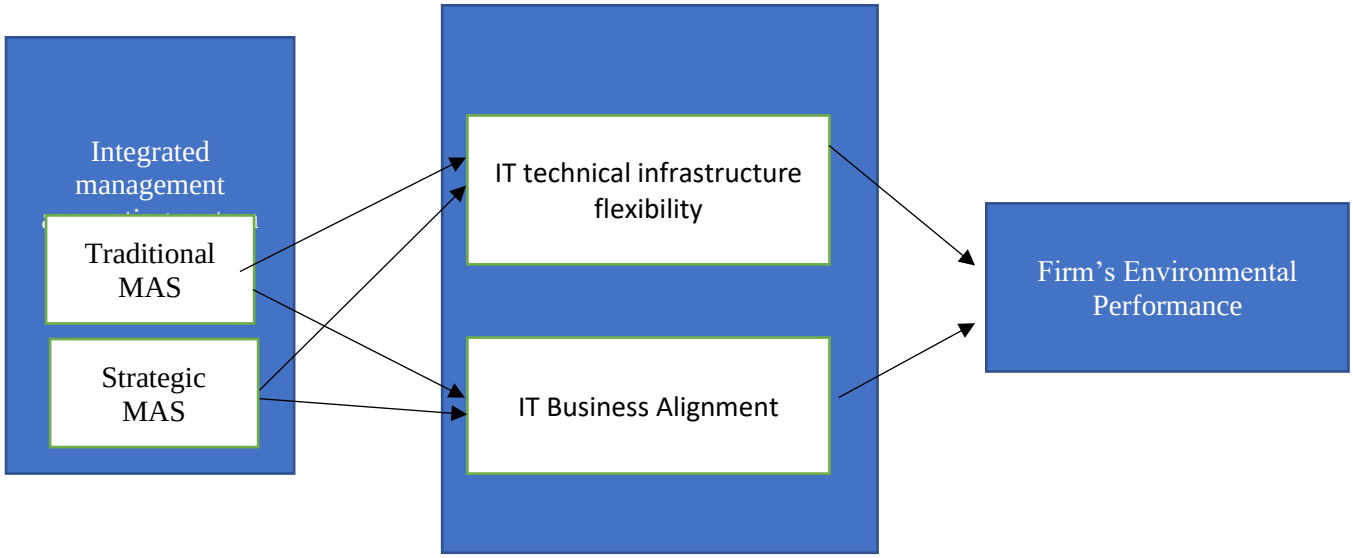

Figure 1: Research Model

4. RESEARCH METHODOLOGY

This study employs a positivist ontology, an empirical epistemology, and a quantitative data-collecting and analysis methodology. Swartz et al. (1998) stated that a methodological framework should be established from a literature review. To assess the impact of IT technology on firm performance indicators, most previous research has chosen a methodology and analysis comparable to that of the present study. Rather than seeking new insights, the researcher sought to corroborate outcomes given in prior studies; thus, a deductive strategy was utilized.

A survey was used to collect data for this study because it allows researchers to draw useful conclusions about a population by surveying a representative sample (Vogt et al., 2012). The research population is comprised of Janwa Group workers. Janwa Group is one of the leading oil suppliers in Iraq. The business has existed for years and has a reputation for being ecologically conscious. The group was targeted because they possessed advanced environmental conservation skills, and the personnel was deemed viable responses because of their kind and skill set.

The survey is the fundamental method for analyzing the relationships between variables (Cozby, 2009). The company's headquarters will provide a list of management personnel in the various offices of the Janwa groupings. This list will serve as the sample frame. Then, 450 employees were randomly selected and contacted to gain their consent to participate in the study. 356 individuals agreed to participate. The researcher then e-mailed the cover letter and questionnaire to the respondents. Employees were given online questionnaires to express their opinions. The questionnaires allowed the researcher to collect as much data as possible about the subject of inquiry. Time savings is the primary advantage of the questionnaire (Opara et al., 2021). Numerous questionnaires were distributed simultaneously, and the questions were direct. It would take approximately five minutes to complete a questionnaire.

The study investigated the connection between integrated management accounting systems and the environmental performance of businesses. In addition, we utilized the mediating variables of IT technical infrastructure

flexibility and IT Business Alignment. A second-degree construct was used to evaluate the integrated management accounting system. This variable was measured using the classic MAS and strategic MAS constructs. SMAS was assessed with 14 items and TMAS with four. These two variables' elements were taken from Visedsun et al. (2021). Wang et al. (2015) adopted the dependent and mediational factors. The flexibility of the IT technical infrastructure was measured with four factors, IT Business Alignment with six, and Environmental Performance with four. On a 5-point Likert scale, items of measurement were determined. After collecting data from respondents, the researcher examined the data using appropriate software packages such as SPSS and Amos. This software enables researchers to evaluate and test data effectively.

5. RESULTS AND ANALYSIS

Figure 2 displays the demographic characteristics of this study's respondents. Demographic characteristics of a survey provide insight into the nature of respondents. A demographic profile benefits the researcher in terms of the aspects and characteristics of the population that facilitate the generalization of the results. There are 323 total responders, 48% females and 52% males. In addition, age group breakdowns revealed that 81 respondents were aged 20 to 30 years, 96 were aged 31 to 40 years, 97 were aged 41 to 50 years, and 49 were aged 51 to 60. The education level profile reveals that 38% had a bachelor's degree, and 62% had a master's degree or higher. Lastly, the respondents' employment experience exceeded one year. Forty had less than two years of experience, 140 had between two and five years, 106 had between five and eight years, and the remaining 37 had over eight years of experience.

Descriptive analysis is extremely important for determining response direction, data normality, and the presence or absence of outliers. According to Table 1, the scale endpoints for the Likert scale utilized in the current study for data collection were 1 and 5. In addition, the mean values of the provided data are close to 4, indicating that most respondents agreed with the claims about the variable. All study variables adhere to the skewness criterion of -1/+1, as indicated by the skewness reporting of the data. This indicates that the data follows a normal distribution.

Cronbach's alpha measures an instrument's internal consistency or dependability (Heale et al., 2015; Mohajan, 2017). The alpha variable is a ratio between 0 and 1. If the value is close to zero, the construct items have low reliability. If it is close to 1 and over 0.65, it is typically indicative of a reliable research instrument (Ganesh et al., 2022; Geldhof et al., 2014). A value below this threshold necessitates reevaluating the sample size or replacing the materials.

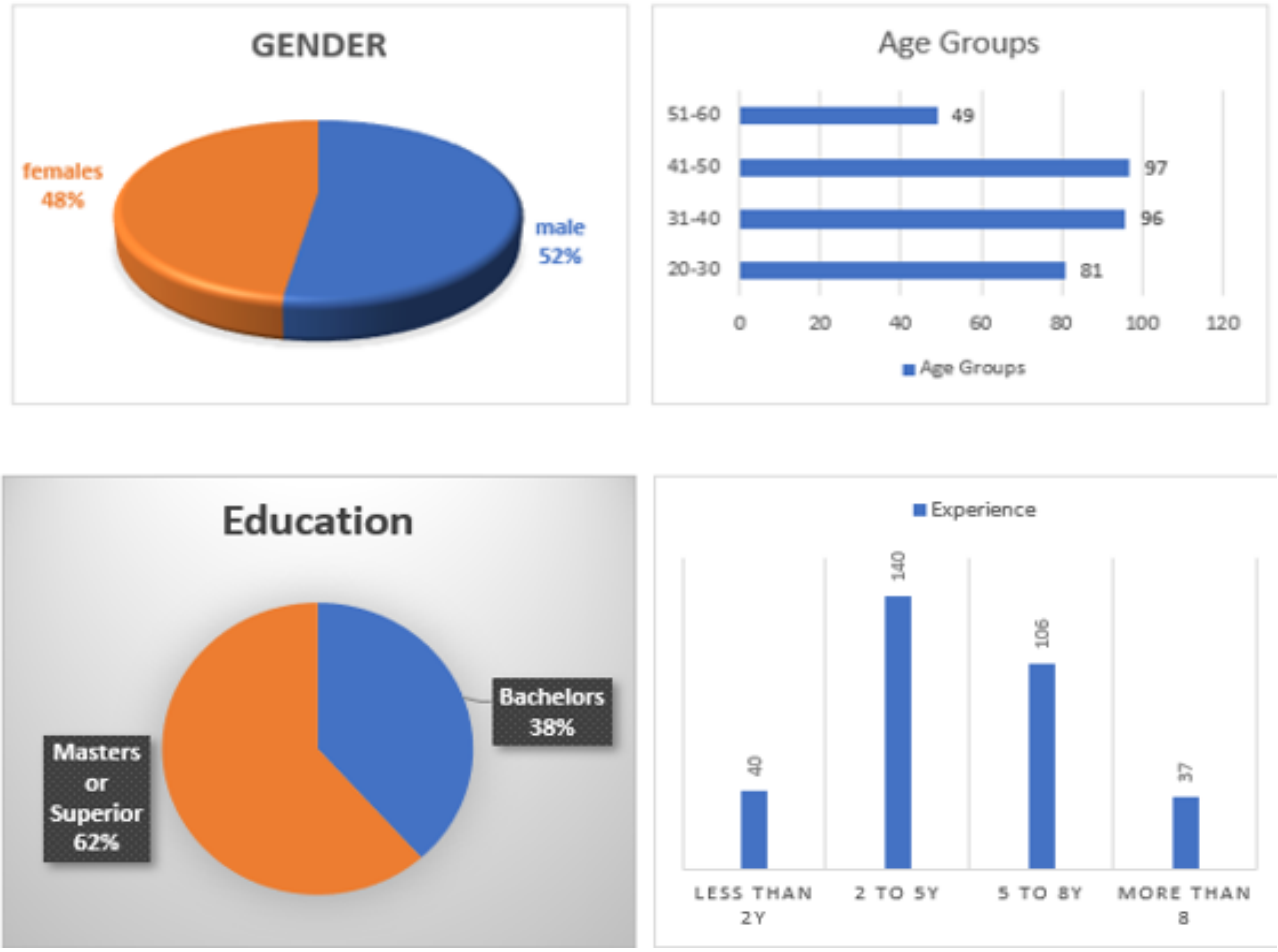

Figure 2: Demographic Profile Summary

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
SMA	323	1.00	5.00	3.4799	1.16093	-.656	.136
TMA	323	1.00	5.00	3.5359	1.11033	-.810	.136
ITB	323	1.00	5.00	3.5480	1.16453	-.759	.136
ITI	323	1.00	5.00	3.4241	1.10240	-.548	.136
EP	323	1.00	5.75	3.4311	1.06782	-.235	.136
Valid N (listwise)	323						

Table 2: Cronbach Alpha

Variables	No. of Item	Cronbach alpha
SMA	14	.894
TMA	4	.917
ITB	6	.781
ITI	4	.826
EP	8	.489

KMO and Bartlett's two-part test measures the strength of the correlations between different study constructs (Aftab Uddin et al., 2015). The results of the KMO and Bartlett's tests are shown in Table 3. The KMO indicator indicates sampling adequacy of 95.3%. Additionally, Bartlett's sphericity is significant. Overall, the results in table 3 show that the sample is sufficient and can be used for further analysis.

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.953
Bartlett's Test of Sphericity	Approx. Chi-Square	13275.150
	df	322
	Sig.	.000

In addition, exploratory factor analysis is performed to estimate the variance contributed by each item included in the study. For exploratory factor analysis, the rotated component matrix is employed. Individual loading items for each of the research constructs are displayed in this matrix. 0.6 is the threshold value for factor loadings. According to table 4, seven iterations of rotations were required to equalize the variables, and the item loadings exceeded the 0.6 standards. Consequently, there is no cross-loading between the objects.

Table 4: Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
SMA1			.656		
SMA2			.685		
SMA3			.746		
SMA4			.794		
SMA5			.689		
SMA6			.748		
SMA7			.757		
SMA8			.693		
SMA9			.775		
SMA10			.748		
SMA11			.781		
SMA12			.729		
SMA13			.775		
SMA14			.754		
ITB1	.713				
ITB2	.810				
ITB3	.776				
ITB4	.914				
ITB5	.914				
ITB6	.919				
TMA1					.925
TMA2					.923
TMA3					.801
TMA4					.640
ITI1		.689			
ITI2		.690			
ITI3		.725			
ITI4		.682			
EP1				.674	
EP2				.674	
EP3				.633	
EP4				.782	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 7 iterations.

On the research data, the researcher has additionally undertaken confirmatory factor analysis. Estimation of model fitness is a component of CFA. Model fitness tests are a collection of tests used to develop a measurement model by validating the interdependence of the model's latent constructs. The model's fitness is validated using CMIN/DF, GFI, IFI, CFI, and RMSEA values. The values for contemporary fitness tests are shown in Table 5. In addition to the stated numbers, the threshold ranges for each indication are also provided. Table 5 demonstrates that each indicator falls inside the threshold range, indicating that the overall model is suitable for further examination. All indicators comply with the specified threshold levels, as seen. IFI and CFI are more significant than 0.9, i.e., 0.938; RMSEA is less than 0.08, i.e., 0.059.

Table 5: Model Fitness

Indicators	Threshold range	Current values
CMIN/DF	Less or equal to 3	2.079
GFI	Equal or greater .80	.798
CFI	Equal or greater .90	.938
IFI	Equal or greater .90	.938
RMSEA	Less or equal .08	0.059

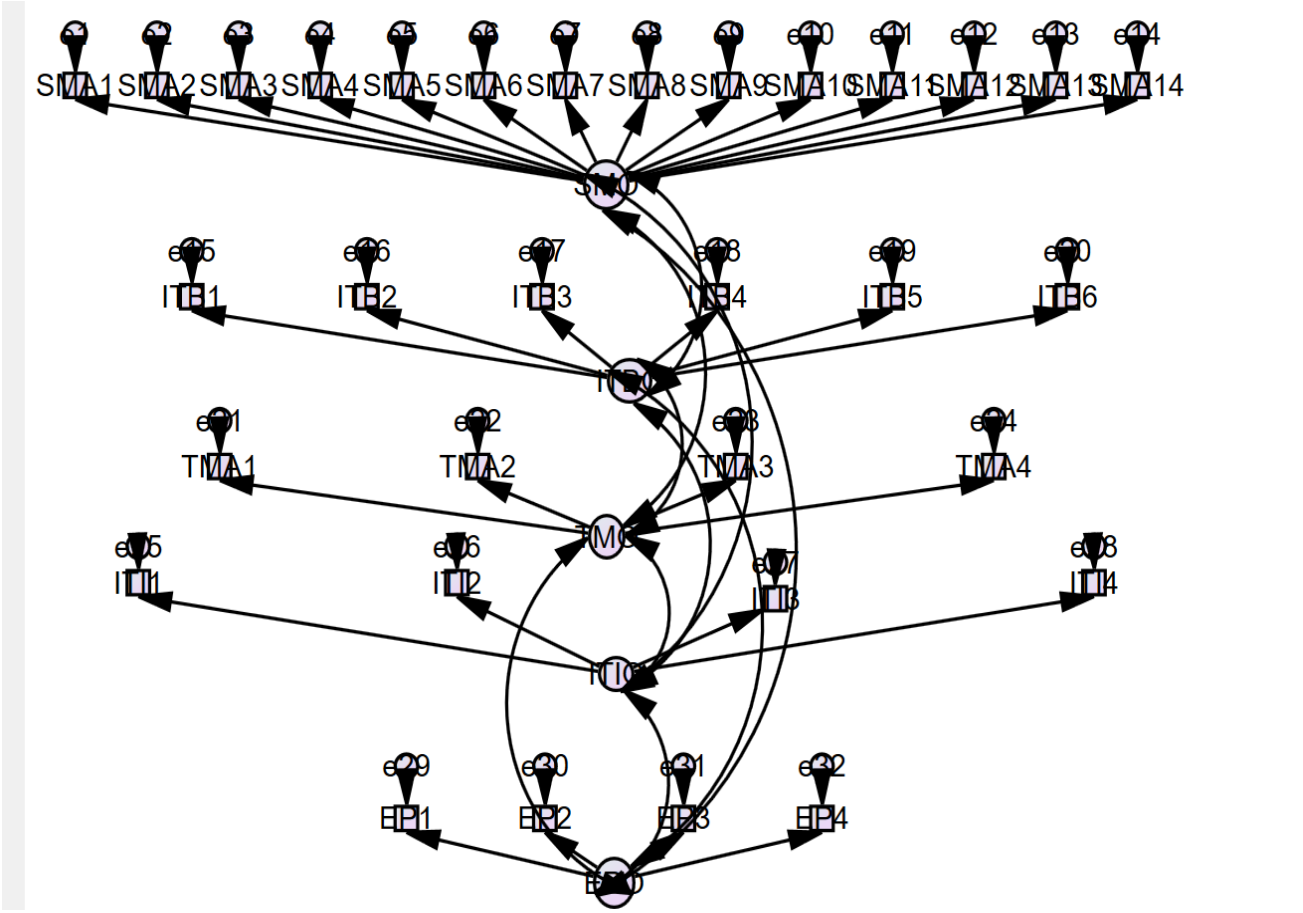

Figure 3: CFA

Construct validity was the second component of the research's confirmatory factor analysis. Construct validity evaluates the constructs' dependability based on convergent and discriminant validity values. For concept validity to be established, the data must possess both convergent and discriminant validity. Convergent validity is the extent to which items within a construct measure the same notion and have the capacity to yield comparable findings. Composite reliability, average variance extracted, and MSV are used to quantify convergent validity. The composite reliability assesses the internal consistency of the constructs, whereas the average variance extracted measures the variation between these constructs. MSV is a variance variable as well. The CR criterion is 0.70, the AVE threshold is 0.5, and MSV must be below AVE (Bagozzi et al., 1991). The data presented in the table demonstrate that CR and AVE are within their respective thresholds, whereas MSV values are below the reported AVE values. Table 6 also includes the calculation of discriminant validity. Discriminant validity is the distinction between measures of a construct or variants. The self-correlation value of the concept must be greater than the correlation with each of the variables for this validity to be accepted. The numbers in Table 6 suggest that both discriminant and convergent validity exist in the data, validating the data's construct validity.

Table 6: Convergent and Discriminant Validity

	CR	AVE	MSV	SMA	TMA	ITB	ITI	EP
SMA	0.905	0.778	0.539	**0.882**				
TMA	0.951	0.795	0.348	0.343	**0.892**			
ITB	0.915	0.756	0.336	0.484	0.580	**0.869**		
ITI	0.929	0.813	0.348	0.408	0.590	0.505	**0.902**	
EP	0.921	0.631	0.320	0.399	0.566	0.542	0.410	**0.794**

The tests described above demonstrate that the sample size of the data is sufficient, that the model is suitable for further analysis, and that the overall study constructs have internal consistency and reliability validity. These tests are required as they indicate that structural equation modeling can be done on the obtained data and the proposed research model. SEM is a multivariate statistical technique that incorporates various types of regression analysis, including factor and multivariate regression analysis. The SEM results are shown in Table 7. The direct effect measures the variation that an integrated management accounting system produces in the dependent variable of environmental performance. The indirect impact represents the effect of the independent factors on the dependent variable as mediated by ITBA and ITIF. Table 7 demonstrates that all hypotheses are supported. According to Table 7, a single rise in the use of strategic management accounting systems will necessitate a 5.2% improvement in environmental performance.

Similarly, a 10% rise in adopting classic managerial accounting systems will lead to a 16.4% increase in environmental performance. The impact of SMA on EP is moderated by integrated IT business alignment by 4.1%, and the impact of TMA on EP by 1.2%. Similarly, IT infrastructure flexibility mediates the 4.6% influence of SMA on EP and the 1.8% impact between TM and EP.

Table 7: Hypothesis Testing

PATH	B	SIGNIFICANCE
SMA→EP	.052	.061
TMA→EP	.164	.014
SMA→ITB→EP	0.041	.016
TMA→ITB→EP	0.012	0.002
SMA→ITI→EP	0.046	0.014
TMA→ITI→EP	0.019	0.028

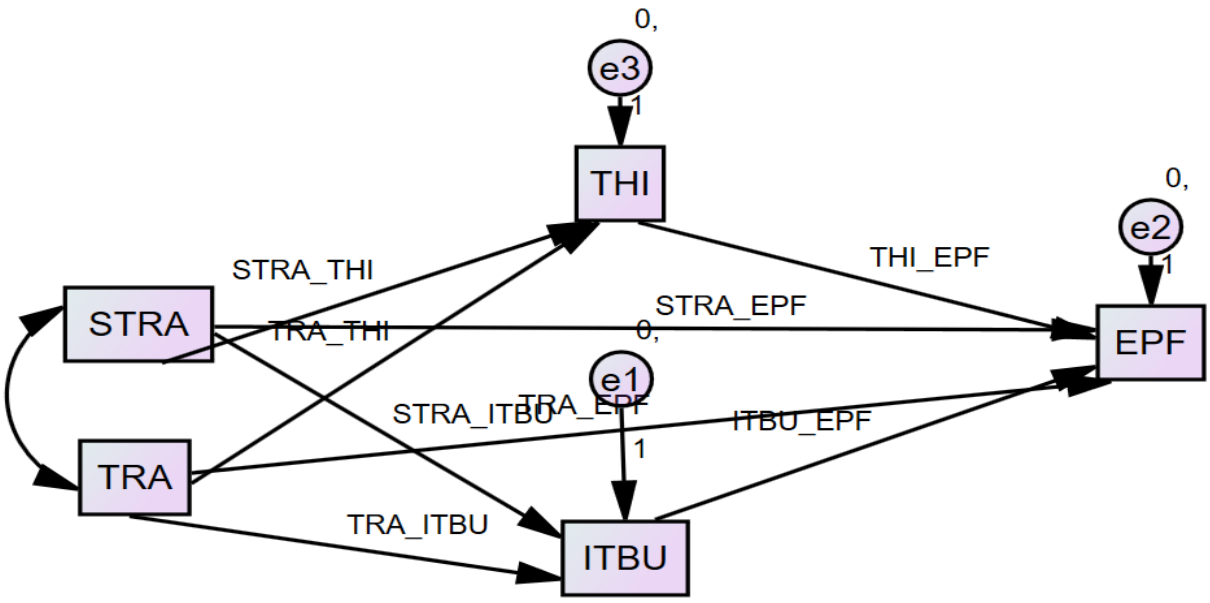

Figure 4: SEM

6. DISCUSSION AND CONCLUSION

1.5 Discussion

The management accounting system is a complicated system that simplifies the environmental management process, detects all environmental-related actions, and assesses their costs. A business mustn't lose sight of its environmental goals. This approach evaluates the cost of each company's environmental impact decision. It enables managers to select the most efficient and cost-effective approach to their goal. Additionally, the system discovers and monitors resource utilization. Resource waste is one of the causes of poor environmental performance. Therefore, such a system analyzes the utilization of various energy sources and notifies the organization of areas where

immediate modifications are required (Gunarathne et al., 2021).

Based on six hypotheses, a quantitative survey was undertaken for this study. These hypotheses were examined using SEM analysis. This study's initial hypothesis stated, "Traditional MAS has a substantial effect on a company's environmental performance." This hypothesis expected a direct correlation between traditional MAS and a company's environmental performance. The investigation supported this hypothesis, which revealed that TMAS had a significant and positive effect on environmental performance. The second premise of the study was "Strategic MAS has a substantial effect on a company's environmental performance." This hypothesis also suggested a direct correlation between strategic MAS and a company's environmental performance. The investigation supported this hypothesis, which revealed that SMAS had a significant and favorable effect on environmental performance. Prior studies also validate these findings. Researchers have found that management accounting solutions improve an organization's performance outcomes. Integrating business intelligence and technology into managerial accounting responsibilities can give organizations additional benefits, including improved monitoring and accountability capabilities (Visedsun et al., 2021; Wang et al., 2015). IMAS can assist businesses in lowering their energy consumption and improving their energy management (Adusei, 2018; Alaeddin, 2019; Alaeddin et al., 2018; Fuzi et al., 2016). Using an integrated management accounting system also enables businesses to monitor activities that embrace environmental quality and improve environmental performance (Asiaei et al., 2022; Haseeb et al., 2019). These results validate the effect of TMAS and SMAS on an organization's environmental performance.

The remaining hypotheses were for demonstrating mediation effects. The third and fourth hypotheses were "IT technical Infrastructure Flexibility mediates the relationship between Traditional MAS and a firm's environmental performance" and "IT technical Infrastructure Flexibility mediates the relationship between strategic MAS and the environmental performance of a firm." These hypotheses illustrate the mediation of IT infrastructure technological flexibility. The last two hypotheses were "IT Business Alignment mediates the relationship between Traditional MAS and the firm's environmental performance" and "IT Business Alignment mediates the relationship between strategic MAS and the firm's environmental performance." These hypotheses represent IT Business Alignment mediation. Prior studies also validate these findings. The literature demonstrates that a company's proficiency in the process of leveraging IT technical infrastructure flexibility can impact its environmental management processes and overall business performance and efficiency (Antoni et al., 2020; Benitez et al., 2018; Castro et al., 2021; Chen et al., 2017; Masa'deh, 2013; Wang et al., 2015). Similarly, the literature indicates that IT-business alignment enables better integration of environmental management processes within an organization and improves overall business performance (Boulagouas et al., 2020; Epstein et al., 1998; Gölgeci et al., 2019; Wang et al., 2015; Zhang et al., 2022).

1.6 Conclusion

Reputational harm is one of the critical consequences of failing to comply with environmental regulations (Asiaei et al., 2022). Environmental performance indicators assist businesses in preventing circumstances that result in financial and reputational losses. The current study concludes, therefore, that environmental performance is essential for a business. Moreover, IT infrastructure is critical in boosting environmental management performance outcomes. Using traditional MAS and strategic MAS supported by a robust IT infrastructure can enable companies with a considerable carbon footprint, such as the Oil and Gas industry, to improve their environmental effect.

7. IMPLICATIONS

This work has numerous practical applications. First, employing the system to measure environmental performance is advantageous since it reduces expenses. Companies can avoid significant financial losses from environmental concerns by utilizing these systems, which enable them to make quality judgments that help them concentrate on what is necessary and what should be avoided. When environmentally friendly options are employed, production costs are also decreased. By measuring performance, the organization identifies innovative and environmentally sustainable means of achieving its goals and reducing expenses. In addition, sales can be enhanced by monitoring environmental conditions (Jovanović et al., 2022). It is essential to recognize that decisions are costly and that a single action can lead to the demise of an enterprise. As a result of customer retaliation, businesses that pollute experience a decline in sales. Suppose, however, that a business employs a management accounting system. In this scenario, the company can aid in avoiding environmental dangers and become renowned as a compliance business. Customers are drawn to brands that consider their requirements.

8. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

Several obstacles were encountered while doing the research. Due to the study's initial scheduling constraints, the questionnaires were done hastily. Participants had a limited amount of time to complete their questionnaires. The problem was resolved by distributing online questionnaires, which saved time and resources. The response rate of the target population posed a further difficulty. 130 persons were eligible to participate. However, not all of them followed the instructions. The research author used only complete responses for this task to prevent getting unnecessary or misleading information.

Technology has evolved into a highly useful tool for businesses. In the past, businesses were required to collect data manually and undertake analysis to make informed judgments. Today, however, technology provides a feasible alternative. Integrating environmental performance characteristics into a management accounting system is one of the wisest decisions a company can make. Environmental conservation is an important issue; businesses that fail to see the necessity for this system will eventually incur substantial losses (Velte, 2021). By utilizing the system, businesses spend less time and money accomplishing environmental objectives. Therefore, it is crucial to establish mechanisms to achieve environmental objectives. Future academics should explore how environmental KPIs may be easily monitored from remote locations for organizations with multiple branches to prevent one branch from incurring huge losses when the problem is easily solvable. In addition, future studies should investigate the influence of environmental, employee-oriented, and organizational aspects as mediator variables between the integrated management accounting system and the environmental performance of enterprises.

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