Academic Journal of International University of Erbil

Journal Homepage: https://ojs.cihanrtv.com/index.php/public

PRINT-ISSN: 2519-6928

Online-ISSN: 3080-7174

The Impact of Sustainable Management Accounting Practices on Firm Performance: The Mediating Role of Managerial Decision Quality in Industrial Companies in the Kurdistan Region of Iraq

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DOI: https://doi.org/10.63841/iue3261199

Received 31 Jan 2026; Accepted 10 Mar 2026; Available online 25 Apr 2026.

ABSTRACT:

This study aims to examined the impact of Sustainable Management Accounting Practices (SMAPs) on firm performance in industrial companies focusing on managerial decision quality's mediating impact on SMAPs' impact on firm performance. A structural equation model was estimated using 240 questionnaire responses collected from senior and middle managers of manufacturing, construction, energy and agro-processing industries in the Kurdistan Region of Iraq (KRI). The study findings provide robust empirical evidence that adopting SMAPs significantly improves the quality of decisions made and enhancing financial and non-financial outcomes across industrial companies. This study underscores that integrating environmental, social and economic metrics with management accounting systems is of significant importance in improving firm performance, a key element essential in driving competitiveness and resilience in industrial sectors. SMAPs' role in improving managerial decision quality highlights sustainability-informed accounting systems' role in enriching managerial decisions' informational basis, which helps to enhance the comprehensiveness, timeliness and forward-looking nature of managers' actions. Our study extends direct effects models to provide a comprehensive understanding of how industrial managers can uitilise SMAPs to create value by empowering them with better information and high-quality strategic choices, which further translates to sustainable business practices. Integrating sustainability measures should be encouraged so as to move away from traditional accounting systems and help firms make informed strategic decisions. Policy makers should establish and enforce sustainability standards across all industries to encourage compliance and ensure the development of evaluation measures.

Keywords: Kurdistan region of Iraq, Management accounting, Managerial decisions, Mediating effects, Structural equation modelling, Sustainability.

1 INTRODUCTION

With an increase in globalization necessitating a surge in competition and expectations, businesses are imperatively adopting sustainable business practices with an intention of aligning their objectives with environmental and social responsibilities [1]. One notable way businesses have been achieving this is through sustainable management accounting practices, which are increasingly being used by industrial companies as a tool through which sustainability is integrated into reporting practices, performance measurement and decision-making [2]. However, the integration of sustainable management accounting practices is presumed to be context dependent, especially in post conflict economies such as the Kurdistan Region of Iraq, which is characterized by increasing stakeholder pressure for diversification, regulatory transitions and a dynamic social, economic and political context [3].

Although prior studies have examined the relationship between management accounting practices and firm performance [4,5,6], the existing literature reveals three important limitations. First, most empirical evidence has been generated in developed economies characterized by stable institutional environments and mature sustainability reporting systems [7–

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10]. Second, sustainable management accounting practices (SMAPs) are frequently examined as isolated techniques rather than as an integrated system of sustainability-oriented accounting tools [11–13]. Third, the mechanism through which such practices influence firm performance remains insufficiently explained, particularly regarding the mediating role of managerial decision quality [14–16]. While some studies suggest a positive association between sustainability-oriented accounting and organizational outcomes [17–20], limited attention has been paid to how decision-making processes translate sustainability information into measurable performance improvements. Furthermore, there is no empirical evidence to date that systematically investigates this relationship within industrial companies operating in the Kurdistan Region of Iraq. Accordingly, this study addresses a clearly defined gap by pursuing thew following objectives:

(1) Conceptualizing sustainable management accounting practices as a structured and integrated system;

(2) Modeling managerial decision quality as a mediating variable; and

(3) Empirically testing the framework within the industrial sector of the Kurdistan Region of Iraq.

Achieving these objectives positions this study as one of the contributors to the academic and industrial practice discourse in numerous aspects. Theoretically, this study triangulates sustainability accounting with decision-making and performance management literature and builds on the stakeholder theory and the resource-based view to explore sustainability issues in post-conflict economies. Empirically, this study deploys a Structural Equation Modelling (SEM) approach performed using Smart PLS to test the direct and mediating relationships between SMAPs, managerial decision-making and firm performance, which offers detailed insights into their causal pathways. Practically, this is vital for accounting professionals, managers and policy makers in designing and implementing management accounting practices that can be used to enhance business performance and the achieve sustainable outcomes in the KRI.

Despite representing a novel context, there are fewer studies that explore the adoption of SMAPs in Kurdistan and how it affects industrial companies. The term “novel context” refers not merely to geographical uniqueness but to the institutional and economic characteristics of the Kurdistan Region. The region operates within a transitional and emerging economic structure characterized by evolving regulatory frameworks, limited enforcement of sustainability disclosure standards, concentrated ownership structures, and institutional volatility [21–24]. These structural conditions differ significantly from those of developed economies where most sustainable management accounting research has been conducted [25–27]. Therefore, the Kurdistan Region represents a distinct institutional setting in which the effectiveness of sustainability-oriented accounting practices cannot be assumed to replicate findings from mature markets. By empirically testing the model in this environment, the study contributes context-sensitive evidence to the sustainability accounting literature. Some prior literature suggests that the relationship between sustainability practices and firm performance may weaken in emerging economies due to institutional voids, governance constraints, and resource limitations [28–30]. However, these conclusions remain inconclusive and under-tested. Rather than assuming that the relationship does not hold in emerging contexts, this study empirically investigates whether managerial decision quality functions as an internal governance mechanism capable of strengthening or stabilizing the relationship between sustainable accounting practices and firm performance. Thus, the emerging nature of the Kurdistan Region does not undermine the relevance of the research; instead, it provides an opportunity to test the boundary conditions of established theoretical assumptions.

This study contributes to the journal’s focus on sustainable business practices and performance measurement by empirically examining how sustainability-integrated accounting systems influence firm performance through managerial decision processes. The findings provide evidence relevant to sustainable industrial development, organizational resilience, and responsible production practices, consistent with the journal’s thematic orientation. The next section proceeds to review the underlying theoretical frameworks and related studiers before proceeding to Section Three, which is designed to provide detailed insights into the applied methodological procedures and steps. The results are presented in Section 4. Section Five concludes the study by providing suggestions for future studies.

2 LITERATURE REVIEW

2.1 THEORETICAL OVERVIEW

This study’s theoretical foundation is embedded in the combined stakeholder theory and Resource-Based View (RBV). According to [8], the stakeholder theory posits that instead of maximizing profits, firms should focus on enhancing stakeholders’ value. This assertion aligns with SMAPs, which integrate social and environmental aspects into its managerial reporting and decision-making activities. On the other hand, the RBV contends that organisations will gain a competitive advantage by making a rational use of their valuable, rare and inimitable capabilities and resources [9]. In this context, SMA serves as the desired organizational capability used to enhance an organization’s informational resources to improve the quality of decisions made as well as organizational performance. Combining these two theories is vitals and serves to offer a solid foundation upon which SMAPs’ can be effectively applied to enhance the efficacy of decisions made and firm performance in industrial companies. Given the limited number of studies that have theoretically

explored these relationships, the next section of the study proceeds to examine the underlying connections linking SMAPs with decision-making and firm performance in relation to prior examinations

2.2 PREVIOUS STUDIES

2.2.1 SUSTAINABLE MANAGEMENT ACCOUNTING PRACTICES AND FIRM PERFORMANCE

SMA can be defined as the integration of sustainability principles with management accounting to support decision-making so as to help achieve the desired environmental, social and economic goals [10]. In this study, sustainable management accounting practices are conceptualized as a structured system comprising environmental cost accounting, lifecycle costing, sustainability-oriented budgeting, resource efficiency measurement, and sustainability-integrated performance metrics [31–34]. These practices are treated both as individual tools and as an integrated system that supports strategic sustainability objectives. This clarification addresses potential ambiguity regarding whether SMAPs are examined as isolated techniques or as a coherent management system. Amid such insights, studies on developed economies have demonstrated that SMAPs such as integrated reporting, environmental management accounting and sustainability performance measurement have a positive effect on firm performance [11,12]. This can be reinforced by studies such as Latan et al. [13], which established that companies that adopted SMAPs reported higher efficiency and profitability levels because of better risk management and resource utilization. In other studies, it has been shown that adopting SMA helps to improve stakeholder trust and corporate reputation, resulting in improved stability and market performance [14]. The major challenge with these propositions is that they are yet to be applied to post conflict economies like the KRI. Furthermore, the adoption of sustainability indicators by industrial companies in the KRI is to a large extent dominated by the use of traditional accounting systems that rely and priorities financial metrics [15]. Given this gap, there is a huge need to determine whether adopting SMAPs yields similar performance related outcomes when applied to a post conflict economy. Amid such observations, the following hypothesis will be tested to address this void;

- **H_1:** Sustainable Management Accounting practices have a positive and significant effect on firm performance in industrial companies.

2.2.2 THE MEDIATING ROLE OF MANAGERIAL DECISION QUALITY

Managerial decision-making can be defined as the extent to which highly informed and comprehensive decisions are made timely to align with the organisation's goals [16]. Managerial decision quality is defined as the extent to which managerial decisions are analytically rigorous, informed by sustainability-related accounting information, aligned with long-term strategic objectives, and supported by systematic evaluation processes [35–38]. In this framework, managerial decision quality serves as a mediating mechanism through which sustainable accounting information translates into improved organizational outcomes. It reflects the effectiveness of information utilization rather than merely the availability of data. In order to accomplish this, organisations rely on relevant, accurate and forward-looking information that is provided through SMAPs [17]. Such information is what is termed by RBV as constituting a firm's valuable, rare and inimitable capabilities and resources [9]. Studies have established that SMAPs tend to provide integrated environment cost data and information on long-term risk and social impacts [18]. This information is crucial as it enables managers to make rational and strategic decisions. As a result, this study proposes to test the following hypothesis:

- H_2: Sustainable management accounting practices have a positive and significant effect on managerial decision quality.

High quality decisions have always been known of enhancing firm performance [19,20]. It is from this notion that this study builds in propositions that high-quality decisions lead to improved firm performance. However, the challenge is that managerial decision-making can also mediate the effects of SMAPs on firm performance but this interactive has not yet received due consideration in academic studies, especially in relation to the KRI. Firm performance in this study is conceptualized as a multidimensional construct incorporating both financial and non-financial dimensions [39–42]. Financial performance includes profitability, cost efficiency, and revenue growth indicators. Non-financial performance includes operational efficiency, environmental compliance, sustainability integration, and strategic competitiveness. By adopting a multidimensional perspective, the study avoids narrow financial reductionism and aligns with contemporary sustainability-performance literature. However, there is scanty information about how decision-making quality can mediate the effects of SMAPs on firm performance. The information processing theory posits that better information leads to better decisions, resulting in improved performance [19]. This can be supported by Burritt and Schaltegger's ideas denoting that the adoption of environmental management accounting systems helps to improve waste reduction and energy efficiency-related decisions resulting in low costs and improved environmental performance [20]. When applied to the KRI, this subject matter remains an empirical void that has to be filled. This is because managerial decisions in the KRI are shaped by short-term economic, social and political pressure, which the adoption of SMAPs can potentially be used to improve the quality of decision made. Given such gaps, this study proposes to test the following hypotheses:

- H_3: Managerial decision quality has a positive and significant effect on firm performance.

- H_4: Managerial decision quality mediates the relationship between sustainable management accounting practices and firm performance.

Having developed the underlying hypotheses linking SMAPs with decision-making quality and firm performance, the conceptual model provided in Figure 1 forms the basis on which this study's applied SEM methodology was derived. Further methodological details are provided in Section 3.

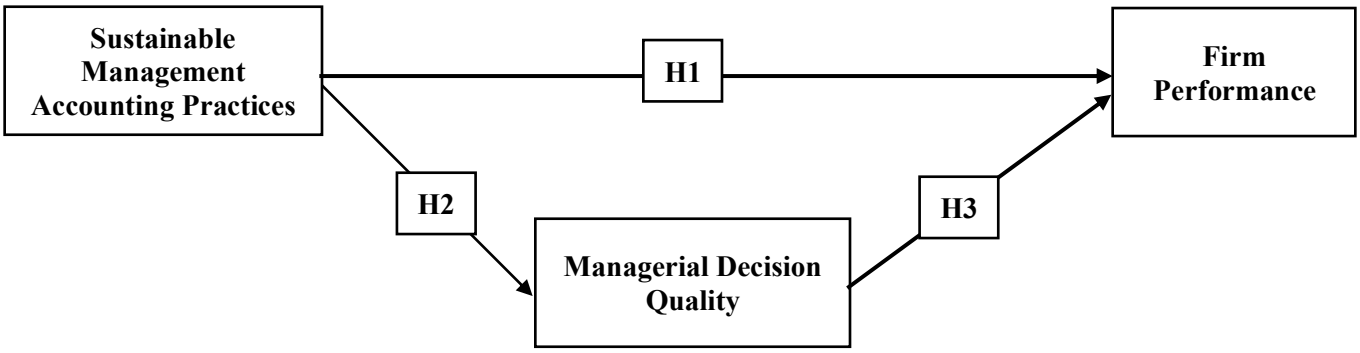

FIGURE 1. Conceptual framework.

3 METHODOLOGY

3.1 RESEARCH APPROACH

Quantitative survey-based research was used to analyses the mediating effects of managerial decision quality on SMAPs' impact on firm performance. This was accomplished by applying a SEM approach using Smart PLS, which helped to test the underlying direct and indirect relationships. Applying a SEM approach has always been known of simultaneously testing mediating and moderating effects, which makes it highly suitable for testing complex models and providing robust details [21]. The collected data was inputted into Microsoft Excel and coded using Smart PLS. Reverse coding and data cleaning techniques were used to identify and deal with data entry errors before coding the data using Smart PLS.

3.2 POPULATION AND SAMPLING TECHNIQUES

The study population comprised of middle and senior managers drawn from manufacturing, construction, energy, and agro-processing industrial companies in Erbil, KRI. Given the notion that the study intended to model managerial decision-making quality's mediating effects on SMAPs' impact on firm performance, purposive sampling was applied. Studies reckon that estimating a SEM requires a minimum sample size of the range between 100 and 200 respondents [22]. In order to ensure that the sample size is an accurate reflection of the study population and account for non-responses, a sample size of 280 respondents was drawn from accounting, finance and strategic decision-making personnel working in industrial companies in Erbil. The industrial companies were randomly selected.

3.3 VARIABLES AND MEASUREMENT

A questionnaire was used to collect data from the manufacturing, construction, energy and agro-processing industrial companies. The questionnaire was designed using previously validated scale. SMAPs was measured using 12 items adopted from [13] and [23]. The variable comprised of integrated reporting, environmental cost accounting and sustainability performance measurement dimensions. Managerial decision quality was measured using an 8-item scale adopted from [17] and [24]. The focus was on the dimension's information relevance, timeliness and comprehensiveness. A combination of financial and non-financial indicators was used to measure firm performance with strong focus on environmental compliance and social reputation indicators adopted from [25]. All variables were measured using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). The instrument was testing using a pilot group of 3 accountants, finance managers and strategic decision-makers. High Cronbach's alpha values (SMAPs: Cronbach's α = 0.887; managerial decision quality: Cronbach's α = 0.946 and firm performance: Cronbach's α = 0.922) were obtained, indicating high reliability. Participation in the study was voluntary and no confidential information was collected.

3.4 DATA ANALYSIS TECHNIQUES AND MODEL TESTS

Data analysis was conducted a two-step analysis involving a measurement model assessment step that comprises of factor analysis, which was conducted to determine items that are related as evidenced by factor loadings of at least 0.70 [21]. Reliability tests were conducted using Cronbach's alpha and composite reliability tests, which also demanded values of at least 0.70 [21]. Concerning validity tests, convergent validity was determined using Average Variance Extracted (AVE) test which requires values of at least 0.50 to achiever validity [21]. Discriminant validity was tested using the Fornell-Larcker Criterion test, which requires values of not more than 0.90 to indicate that validity was attained [21].

Probability values obtained from the bootstrapped 5000 samples were used to test the hypothesized relationships. Model quality was determined using R^2 and Q^2. In order to test the estimated model's fit, the Standardized Root Mean Square Residual (SRMR), which requires values less than 0.08 to indicate a good fit [21]. The Normed Fit Index (NFI) criteria that sets a lower limit of 0.90 was also used to determine the extent to which the model fits the data [21]. This was further augmented by the chi-square test and an exact fit criterion comprising of d ULS (Squared Euclidean Distance) and d_G (Geodetic Distance) whose lower values are presumed to indicate better fit [21].

4 RESULTS AND DISCUSSION

4.1 DESCRIPTIVE STATISTICS: FINANCIAL AND SURVEY DATA

Following the distribution of the 280 questionnaires, 240 responses were obtained and the results are presented in Table 1. Male respondents (n=170) dominated the survey compared top female respondents (n=70). The respondent strata comprised of 38.3% manufacturing, 28.3% construction, 18.8% energy and 14.6% agro-processing industries with 110 senior managers and 130 middle managers. The respondents accumulated a high level of work experienced with the 50 respondents having worked for the industrial companies for more than 15 years. This indicates diversity in industrial activities that can translate into well-informed knowledge and views about SMAPs' role in improving firm performance.

Table 1. Descriptive statistics of key variables.

Category	Subgroup	Frequency	Percentage
Gender	Male	170	70.83%
	Female	70	29.17%
	Total	**240**	**100**
Company Sector	Manufacturing	92	38.3%
	Construction	68	28.3%
	Energy	45	18.8%
	Agro-processing	35	14.6%
	Total	**240**	**100**
Position	Senior Manager	110	45.8%
	Middle Manager	130	54.2%
	Total	**240**	**100**
Experience	5–10 years	105	43.8%
	11–15 years	85	35.4%
	More than 15 years	50	20.8%
	Total	**240**	**100**
Education	Bachelor's Degree	125	52.1%
	Master's Degree	90	37.5%
	PhD/Professional Cert.	25	10.4%
	Total	**240**	**100**

4.2 DESCRIPTIVE STATISTICS AND MEASUREMENT MODEL ASSESSMENT

Table 2 presents the descriptive statistics and reliability assessment results. The average mean responses ranged from 3.85 to 4.10 and this indicates that there were strong agreements about the significance of sustainable management accounting and managerial decision quality in industrial companies in Erbil. The variables were highly reliable as evidenced by both the Cronbach's alpha and composite reliability values exceeding 0.70. the AVE values surpassed the minimum 0.50 cut-off [21], indicating that convergent validity was achieved. Table 3 confirms discriminant validity, as the Fornell-Larcker criterion shows that the square root of AVE for each construct is greater than its correlations with other constructs.

Table 2: Descriptive statistics and reliability of constructs.

Construct	Mean	Std. Dev.	Cronbach's Alpha	Composite Reliability	AVE
Sustainable Management Accounting	3.85	0.72	0.89	0.92	0.68
Managerial Decision Quality	4.10	0.65	0.87	0.90	0.71
Firm Performance	3.95	0.68	0.91	0.93	0.73

Table 3. Discriminant validity (Fornell-Larcker Criterion)

	SMA	MDQ	FP
SMA	**0.825**		
MDQ	0.612	**0.843**	
FP	0.598	0.674	**0.854**

4.3 STRUCTURAL MODEL AND HYPOTHESIS TESTING

4.3.1 PATH ANALYSIS

The bootstrapped results provided in table 4 show that adopting SMAPs significantly enhances firm performance by 0.312 and managerial decision-making quality by 0.587. This validates hypotheses 1 and 2. Hypothesis 3 was not validated following the establishment that managerial decision quality insignificantly affects firm performance by 0.021. However, the study confirms managerial decision quality's partial mediating effects on SMAPs' impact on firm performance (β=0.294; p=0.000). R^2 shows that 53.1% of the changes in the industrial companies' performance is explained by SMAPs and managerial decision quality. In addition, 34.5% of the changes in managerial decision quality are explained by SMAPs. This is associated with a predictive relevance of 0.15 and this indicates large effects.

Table 4. Structural model and hypothesis testing.

Hypothesis	Path	β	t-value	p-value	Result
H1	SMAPs → Firm Performance	0.312	4.876	0.000	**Supported**
H2	SMAPs → Managerial Decision Quality	0.587	9.234	0.000	**Supported**
H3	Managerial Decision Quality→ Firm Performance	0.021	0.793	0.318	**Not supported**
H4	SMAPs → MDQ → FP	0.294	5.012	0.000	**Supported**

Note: R^2 (Firm Performance) = 0.531; R^2 (Managerial Decision Quality) = 0.345; Q^2 (Predictive relevance) > 0.15 for both endogenous constructs

4.3.2 MODEL FIT RESULTS

The SRMR value was lower than the 0.08 limit and this indicated the model had as good fit. In further support of this finding, the NFI value exceeded the required minimum 0.90 and the chi-square value of 9.076 was significant at 0.001 level. d_G and d_ULS values of 1.198 and 3.457 were lower than their lower (LCI) and upper (UCI) confidence interval values. This indicates that the model had a good fit and weas well poised to provide explanations about the impact of sustainable management accounting practices on firm performance in the KRI. As a result, the next section of the study proceeds to discuss the findings.

Table 5. Model fit results.

Indicator	Result	Acceptable range
SRMR	0.064	< 0.08
NFI	0.953	> 0.90
Chi-square	9.076*	< 0.001
d_G	1.198	< LCI
d_ULS	3.457	< UCI

4.4 DISCUSSION

4.4.1 THEORETICAL INTEGRATION AND COMPARISON WITH PRIOR STUDIES

The established findings offered vital evidence concerning the interplay between SMAPs, decision making quality and firm performance amongst industrial companies in Erbil, KRI. With a significant positive interaction spanning from SMAPs to firm performance ($\beta = 0.312$, $p < 0.001$), the findings confirmed that adopting SMAPs contributes towards improving the performance of industrial companies in the KRI. When aligned with the stakeholder theory, this also helps to enhance stakeholders' value as firms continue to integrate social and environmental aspects into their managerial reporting and decision-making activities [8]. This finding mirrors similar insights established from developed countries [13,14] and, therefore, suggests that integrating sustainability practices with accounting systems is vital for mitigating risks and enhancing resource efficiency and stakeholder confidence.

While prior studies often focus on developed markets [4,5], this research reveals that SMAPs' positive and significant impact of 0.587 on decision-making quality highlights their informational value when adopted in industrial companies. This is possibly because providing timely, integrated forward-looking sustainability information serves as capability that the RBV contends that it propels firms to make rational decisions [9]. This tends to improve the firm's ability to make relevant and comprehensive decisions. Such is similar to Cyert and March's study on behavioral theory of the firm, which highlights the significance of information processing in influencing the quality of decisions made by firms [19]. In addition, the information processing theory posits that better information leads to better decisions, resulting in improved performance [19]. Our study extends these insights to a post conflict economy of the KRI and highlights that adopting SMAPs is critical to making informed decisions in industrial companies capable of enhancing financial and non-financial outcomes. The resultant effects can also be evidenced from the findings depicting that managerial decision quality has a positive effect of 0.021 on firm performance.

4.4.2 UNIQUE FINDINGS

This study made an interesting discovery highlighting that managerial decision quality significantly mediates SMAPs' impact on firm performance by 0.294. Despite having analyzed the direct connections between information quality and better decisions [19] and Burritt and Schaltegger's study on environmental management accounting systems, waste reduction and energy efficiency-related decisions [20], the potential to mediate such roles within the context of SMAPs had not been a feature in previous studies. As a result, this study makes an interesting contribution to sustainability and behavioral management discourses highlighting that adopting SMAPs is essential for improving the quality of decisions made and the resultant performance across industrial companies, which further translates to sustainable business practices. In other words, this study uses the SEM approach to highlight managerial decision quality's critical role in translating sustainability information into tangible performance outcomes.

CONCLUSION

This study examined the impact of SMAPs on firm performance in industrial companies in the KRI focusing on managerial decision quality's mediating impact on SMAPs' impact on firm performance. The study findings provide robust empirical evidence that adopting SMAPs significantly improves the quality of decisions made and enhancing financial and non-financial outcomes across industrial companies. This study underscores that integrating environmental, social and economic metrics with management accounting systems is of significant importance in improving firm performance, a key element essential in driving competitiveness and resilience in industrial sectors. SMAPs' role in improving managerial decision quality highlights sustainability-informed accounting systems' role in enriching managerial decisions' informational basis, which helps to enhance the comprehensiveness, timeliness and forward-looking nature of managers' actions. Our study extends direct effects models to provide a comprehensive understanding of how industrial managers can utilize SMAPs to create value by empowering them with better information and high-quality strategic choices, which further translates to sustainable business practices.

RECOMMENDATION

THEORETICAL IMPLICATIONS

Theoretically, this study combines the stakeholder and the RBV theories to offer a solid foundation upon which SMAPs' can be effectively applied to enhance the efficacy of decisions made and firm performance in industrial companies. In addition, validating their purposed implications on SMAPs, managerial decision-making and firm performance helps to advance understanding of how managerial cognition and decision processes enhance firm performance.

PRACTICAL IMPLICATIONS

Given the significance of SMAPs in improving performance, industrial company managers need to invest in SMA training and systems. Integrating sustainability measures should be encouraged so as to move away from traditional accounting systems and help firms make informed strategic decisions. Policy makers should establish and enforce sustainability standards across all industries to encourage compliance and ensure the development of evaluation measures.

LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Despite making substantial contributions to the sustainability, behavioral management and accounting discourses. this study, has limitations. Foremost, limiting the study to Erbil in the KRI entails that the findings cannot be generalized to other regions and country. Secondly, relying on questionnaires tends to create a self-reported bias problem. Lastly, it is difficult to make causal inferences because of the study's cross-sectional design nature. In order to address these challenges, future studies can conduct a comparative analysis of similar aspect across other regions in the KRI such as Dohuk and Sulaymaniyah, and even extend it to other countries as well. Incorporating financial measures such as return on assets and net interest margins can help provide detailed changes in firm performance. It also remains important to incorporate moderation variables such as regulatory pressure, leadership style and the role of digital technology as these aspects are crucial in KRI and academic research debates.

FUNDING

N/A.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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