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The Effects of Management Accounting Systems on Sustainability Reporting Strategies

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ABSTRACT

The customary management accounting system (MAS) is implemented to perceive the organization's economy-oriented plans, though it overlooks the social and environmental strategies. This research explored the effects of MASs on sustainability reporting strategies. The statistical population to identify the characteristics of the MAS and sustainability reporting techniques comprised 31 academic and professional experts, including professors of management accounting and financial managers of the stock exchange-listed companies, selected through the snowball sampling method. Similarly, the statistical population to validate the identified characteristics and strategies and investigate the correlation between them comprised 384 financial managers of listed companies, with their sample size determined by Cochran's formula. The characteristics of the MAS and sustainability reporting strategies were determined by the fuzzy Delphi (FD) technique, followed by validating the correlation between them using structural equation modeling (SEM) based on the partial least squares (PLS) method. As with the FD results, the MAS's characteristics included influence, relevance, value, and trust. Likewise, the characteristics of the sustainability reporting strategies included aligning the organization's strategic objectives with sustainable development, compiling sustainability principles and standards, identifying the entity that is accountable for sustainability, establishing an internal control system and effective reporting, training on sustainability, and working with novel technologies. The SEM results confirmed the validity of the identified characteristics and strategies while advocating the significant effect of the MAS on sustainability reporting strategies. Accordingly, the MAS based on the sustainability reporting approach as an information system can pivotally identify the goals of sustainable development. Based on the results, companies need to include sustainability information in their decision models, and the MAS should remain accountable for delivering this information and ensuring sustainable value for the company's stakeholders to make them measurably satisfactory.

Keywords: Management accounting, Sustainability reporting strategies, Fuzzy Delphi technique, Structural equation modeling.

1. Introduction

Management is a systematic process for the optimal utilization of human and material resources to achieve organizational objectives within the framework of accepted values, accomplished through planning, organizing, directing, and controlling (Mia & Chenhall, 2020). In this context, management accounting, as a key organizational information subsystem, is responsible for identifying, measuring, analyzing, and communicating financial and non-financial data to support decision-making, control, and performance evaluation (Abdelhalim, 2024). Unlike financial accounting, which focuses on past events, management accounting has a forward-looking nature and, by playing a role in strategic, operational, and tactical decision-making, employs tools such as budgeting, variance analysis, investment appraisal, and performance indicator design (Enslin et al., 2023; Soobaroyen, 2019; Lawerence, 2017). Furthermore, through approaches such as responsibility accounting, management accounting equips organizational structures to define duties, delineate levels of authority, and enhance accountability (Hariyati et al., 2023).

Recent decades have shown that traditional financial reporting is limited in conveying information related to the environmental and social impacts of organizations, which has led to the emergence of new approaches in corporate reporting (Asogwa, 2023). Among these, sustainability reporting has emerged as a response to the growing demand for transparency and accountability, focusing on the disclosure of information concerning economic, social, environmental, and corporate governance performance (Gordon and Narayanan, 2019). By enhancing legitimacy, creating sustainable competitive advantage, increasing employee motivation, and improving stakeholder relations, it contributes to strengthening the organization's position (Pramono et al., 2023; Pumiviset and Suttipun, 2024). Since sustainability reporting requires coordination among multiple information systems, the synergy between management accounting systems and other information subsystems plays a decisive role in the quality and coherence of disclosed data (Odonkor et al., 2024).

In the Iranian context, the lack of mandatory regulations and weak institutional infrastructures has resulted in a low level of disclosure of environmental and social indicators among listed companies, while traditional financial accounting systems fail to meet new information needs. This gap underscores the necessity of developing localized integrated models that combine management accounting information with sustainability reporting.

Moreover, despite the growing national literature on integrating management accounting systems and sustainability reporting, international studies indicate that the process of converting internal information capabilities into sustainability innovations and policies often occurs through mediating mechanisms such as Environmental Management Systems (EMS), Environmental Management Accounting (EMA), and adaptive internal controls. Recent empirical research shows that dynamic organizational capabilities, by strengthening EMS or sustainable accounting systems, lead to environmental innovations and improved ESG performance. Therefore, explaining and describing these causal mechanisms in different institutional contexts still presents theoretical and empirical opportunities (Huang & Xiao, 2023; Xia et al., 2025). The present study seeks to strengthen this theoretical practical bridge and, by presenting a model that links the characteristics of MAS through analytical capabilities and intra-organizational coordination to sustainability strategies, aims to make a specific and comparable contribution to the international literature.

2. Conceptual framework and literature review

2.1. Management Accounting

Management accounting, as one of the core pillars of an organization's information system, plays a fundamental role in enhancing decision-making effectiveness, optimizing resources, and steering overarching strategies. Despite its growing importance in today's complex and dynamic environments, a historical and analytical review of this field reveals that its alignment with technological developments, competitive pressures, and institutional changes has faced structural and substantive challenges (Hariyati et al., 2023; Asogwa, 2023). In many countries, including Iran, there remains a considerable gap between the academic instruction of advanced analytical methods such as linear programming, regression, and cost analysis and their practical application in real organizational settings, a gap rooted in the weak

linkage between theory and practice, insufficient technological infrastructure, and structural resistance (Pramono et al., 2023). Comparative studies indicate that, in certain periods, industrial advancements have driven the development of management accounting theories; however, in recent decades, the dominant academic trend has focused on designing abstract frameworks that, in some cases, are detached from the real needs of managers (Boyns and Edwards, 1997; Othey, 2001). This disconnect underscores the necessity of interdisciplinary approaches that integrate economics, behavioral sciences, and technology in redefining the role of management accounting.

In the third millennium, technological advancements from the internet and digital platforms to artificial intelligence and big data analytics alongside global transparency and accountability requirements, have compelled management accounting to move beyond traditional financial analyses and to offer analytical and decision-support frameworks in areas such as environmental sustainability, social responsibility, and intellectual capital (Pumiviset and Suttipun, 2024). It is expected that management accounting systems will not only adapt to new conditions but also proactively contribute to enhancing organizational competitive advantage. In recent years, the proliferation of approaches such as Just-in-Time (JIT) production, Total Quality Management (TQM), target costing, benchmarking, the balanced scorecard, Six Sigma, activity-based costing (ABC), and activity-based management (ABM) illustrates the transformation of management accounting from a reporting tool into a strategic partner in designing and improving organizational performance. Nevertheless, its development continues to be hindered by internal factors (organizational culture, employee skills, integration of information systems) and external factors (regulations, competitive pressures, technological changes). Addressing these issues in the research literature can provide more effective solutions for linking informational capabilities to sustainability outcomes. The modern model of management accounting proposed by Anderson (2007) appears suitable for this purpose, as illustrated in Figure (1).

As illustrated in the figure above, the factors driving changes in management accounting operate at three levels. At the first level, future changes, the type of industry, the time horizon, and the geographical location of the company influence management accounting. At the second level, economic variables, political factors, technology, new techniques, legislation, and culture are taken into consideration. Finally, at the third level, value creation, envisioning the future, methodological changes, regulatory frameworks, and reporting are identified as influential factors (Odonkor et al., 2024).

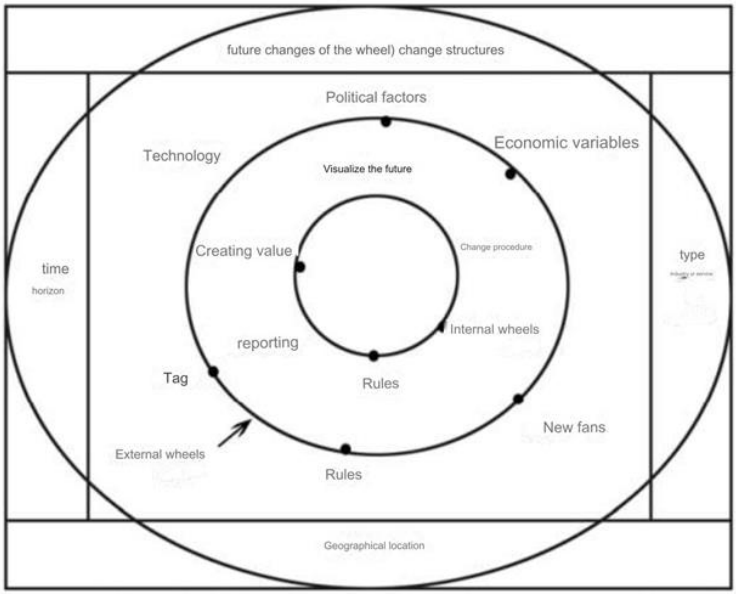

Figure 1. The new model of management accounting in the future. Adapted from Saputra et al. (2023)

2.2. Management accounting based on sustainability reporting

The concept of corporate sustainability has its roots in the definition of sustainable development provided by the World Commission on Environment and Development (Brundtland Commission, 1987), which emphasizes meeting the needs of the present generation without compromising the ability of future generations to meet their own needs. Based on this definition, corporate sustainability, as a business and investment strategy, rests on balancing the interests of current and future stakeholders across three dimensions: economic, social, and environmental. Within the stakeholder theory framework, it reinforces corporate accountability toward all stakeholders (Pramono et al., 2023). In accounting literature, since the 1990s, two main approaches have emerged in examining the relationship between accounting and sustainability: a critical approach, which views sustainability as a simplified tool serving the economic interests of corporations, and a managerial approach, which pragmatically considers the integration of sustainability issues into strategic and operational decisions as an unavoidable necessity.

From the managerial perspective, the primary challenge lies in the full integration of environmental and social criteria into planning processes, resource allocation, and performance evaluation. However, evidence from the Institute for Environmental Management and Assessment indicates that only 13% of companies possess the necessary capabilities to compete in a sustainable economy (Pamiust & Sutipan, 2024). This gap highlights that despite the conceptual expansion of sustainability, many organizations have yet to fully embed these requirements into the agendas of their executive and financial managers. In this context, management accounting can play a strategic role by providing integrated economic, social, and environmental information, thereby aligning organizational strategies with sustainability goals and enhancing transparency and accountability (Edonkour et al., 2024).

Integrated management accounting with sustainability reporting is an intra-organizational branch of accounting that goes beyond merely responding to financial stakeholders and addresses environmental and social information needs as well. Within this framework, tools such as environmental management accounting, carbon management accounting, green supply chain management, implementation of ISO 14000 and ISO 26000 standards, sustainable activity-based costing, social and environmental reporting, and sustainable balanced scorecards are employed as key methodologies (Edonkour et al., 2024).

The “Sustainability Triangle” model, focusing on the economic, social, and environmental dimensions, provides an efficient framework for integrating multidimensional information into managerial decision-making. Recent studies have extended this model by adding political and financial dimensions to better reflect the complexities of the contemporary business environment (Huang & Xiao, 2023; Xia et al., 2025). The fundamental challenge in sustainability management is achieving simultaneous optimal economic, environmental, and social performance, measured respectively through financial efficiency, environmental efficiency, and social efficiency. In this regard, management accounting systems, as primary facilitators of information flow, can bridge the gap between theory and practice by linking analytical capabilities with internal coordination mechanisms toward sustainability objectives, thus contributing to the international literature in this field. Figure 2 illustrates the integrated sustainability triangle.

Environmental efficiency, as a key sustainability indicator, is a relative measure derived from the ratio of an economic indicator to an environmental indicator, commonly defined as "value added created per unit of negative environmental impact." Similarly, social efficiency measures the ratio of an economic metric to a social indicator; for example, value added relative to the reduction in occupational accident rates among employees. Within this context, the concept of ecological justice reflects the interaction and balance between environmental and social objectives, emphasizing the necessity of aligning these two domains within organizational strategies. The central challenge for organizations is to integrate these diverse dimensions in a manner that enables simultaneous monitoring and improvement. Achieving this requires the integration of sustainability accounting data with traditional accounting and management information systems, so that organizational decision-making can be based on a comprehensive picture of economic, social, and environmental performance (Abdelhalim, 2024).

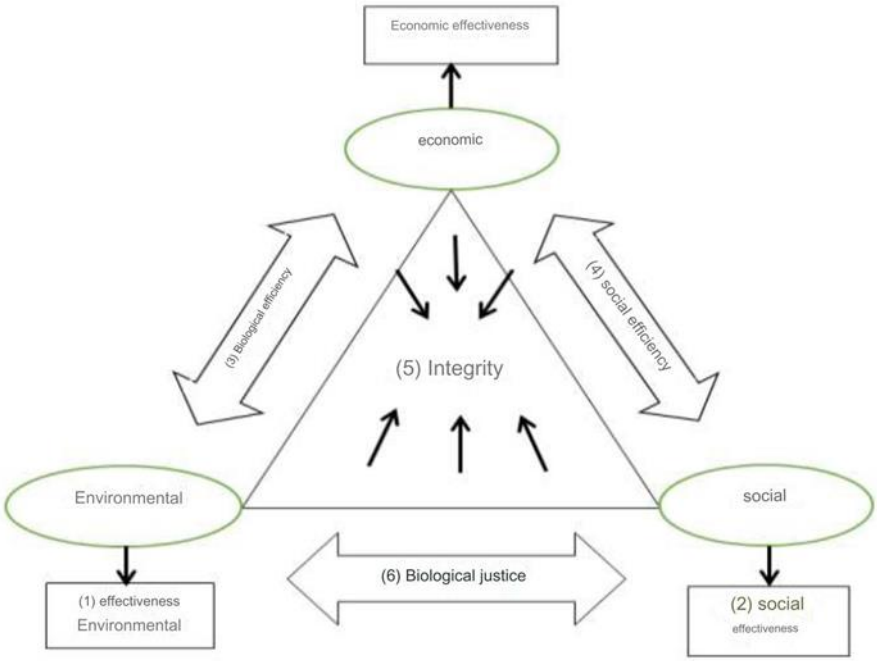

Figure 2. The integrated structure of corporate sustainability data needs with the sustainability triangle. Adapted from Gunarathne et al. (2023)

2.3. Literature review

Numerous studies have examined the relationship between management accounting and sustainability reporting. For instance, Abdelhalim (2024), in a qualitative study within the Saudi Arabian food industry, demonstrated that integrating big data analytics with management accounting plays a significant role in enhancing organizational sustainability performance. Similarly, Gunarathne et al. (2023), through a survey of publicly traded companies in Sri Lanka, found that the maturity level of environmental management significantly affects the intensity and scope of environmental management accounting implementation. In line with this, Saputra et al. (2023) in the Indonesian hospitality industry confirmed that green competitive advantage strengthens the linkage between environmental management accounting and sustainability performance, clarifying how this accounting tool guides management toward environmental issues and aligns operational actions with sustainability goals. Moreover, Kezi and Oyar (2021), examining 297 Turkish companies reporting under the GRI framework, showed that increased awareness and improved quality of sustainability reporting enhance firm value. Nartey and Van der Poll (2021) also found that innovative management accounting practices serve as strategic tools to improve the sustainability performance of small and medium-sized manufacturing enterprises.

In the domestic context, Zhaleh Azad Zanjani et al. (2024) developed an optimized model for Iran's capital market by aligning the reporting requirements of listed companies with international standards, explaining the superior position of various industries in governance, economic, and environmental dimensions. Using a fuzzy Delphi method, Yousefi zadeh (2023) identified eight key dimensions affecting sustainability reporting, including ownership structure, board of directors, company size, profitability, financial leverage, corporate governance, and regulatory framework. Rostami Jaz et al. (2022), employing structural equation modeling, demonstrated that all management accounting practices have a positive and significant relationship with corporate sustainability, moderated by organizational characteristics. Azizpanah et al. (2022) proved that organizational culture can amplify the effect of management accounting techniques on sustainability.

Additionally, Maboodi et al. (2021) revealed that disclosure of sustainability reporting components mediates the link between management accounting techniques and value creation, with the indirect effect being stronger than the direct effect. Furthermore, 3.

Amirbeygi Langroudi et al. (2019), adopting a grounded theory approach, elucidated the requirements and outcomes of integrating sustainable management accounting with strategic decisions. Finally, Shojaei et al. (2017), based on institutional theory, argued that institutionalizing new sustainable management accounting practices requires their interpretation, integration, and reproduction in accordance with the institutional context of each organization.

2.4. International Evidence and Theoretical Gaps

A systematic review of recent international research reveals rapid growth in the role of sustainability-based management accounting systems (SMA/EMA) in developing informational capabilities and sustainability governance. For example, empirical evidence indicates that organizational dynamic capabilities serve as the primary accelerator for developing environmental capabilities, which in turn such as Environmental Management Systems (EMS) or carbon tracking systems mediate the effect of these capabilities on environmental innovation (Huang & Xiao, 2023). Other studies demonstrate that environmental accounting techniques and Environmental Management Accounting (EMA) enhance transparency in reporting and Environmental, Social, and Governance (ESG) performance, and may also act as moderators or mediators within management information channels. In other words, EMA not only generates new information but also reconfigures decision-making structures, thereby facilitating improvements in sustainability outcomes (Xia et al., 2025). Furthermore, strategic measurement systems such as the (Sustainable) Balanced Scorecard ((S)BSC) and management control systems provide practical channels to translate sustainable strategic objectives into operational metrics and controls. Systematic reviews of SBSC highlight the critical importance of these tools in linking strategic frameworks with sustainability reporting, while implementation barriers remain a significant focus for ongoing research (Silva et al., 2025).

2.5. Proposed Causal Mechanisms Between MAS Characteristics and Sustainability Strategies

To clarify the causal linkage between Management Accounting System (MAS) characteristics and sustainability reporting strategies, a three-stage causal framework is proposed, grounded in the capabilities literature, stakeholder theory, and environmental accounting evidence:

Stage 1) Enhancing Informational Capacity (Input):

MAS characteristics such as relevance, reliability, influence, and informational value facilitate the production, refinement, and accessibility of financial and non-financial sustainability-related information for decision-makers. This "informational capacity" is a necessary prerequisite for pursuing sustainability objectives (Oliveira et al., 2023).

Stage 2) Organizational Transformations / Mediators (Process):

The enhanced informational capacity is converted into operational capabilities through the development or strengthening of environmental management systems (EMS/EMA), adaptive internal controls, and measurement-control tools such as the Sustainable Balanced Scorecard (SBSC). In other words, MAS acts as a mediator by shaping EMS/EMA and management controls to activate sustainability strategies (Huang & Xiao, 2023; Xia et al., 2025).

Stage 3) Translation into Strategies and Outcomes (Output):

Once environmental systems and controls are activated, organizations can formulate and implement specific sustainability strategies—including aligning strategic goals with sustainable development, standard-setting, institutionalization, and enhancing sustainability literacy—which ultimately lead to improved reporting transparency and enhanced ESG performance (Huang & Xiao, 2023; Xia et al., 2025).

3. Methodology

This study is applied in terms of its purpose, cross-sectional in terms of its time horizon, and combines both library-based and field research in terms of its setting. The data collection approach is descriptive-survey, and the reasoning method is inductive–deductive. The primary nature of the data is qualitative. In the qualitative phase, the statistical

population consisted of academic and professional experts in the fields of management accounting and sustainability reporting. A snowball sampling method was employed. Although this method is subject to criticism particularly concerning the potential for selection bias it was deemed the most appropriate option for identifying participants, given the difficulty of accessing topic-specific experts. According to Azizi (2016), in specialized domains, many experts are unwilling to participate voluntarily, and traditional random sampling techniques often fail to yield a meaningful and relevant sample.

In addition, the quantitative phase of the study aimed at validating the identified characteristics and strategies and exploring the relationships between them targeted financial managers of listed companies. The sample size for this phase was determined using Cochran's formula, yielding a total of 384 respondents (n = 384).

To identify and filter the core variables, the fuzzy Delphi method was employed in the next stage. This method was selected due to its ability to process expert subjective judgments, particularly when dealing with qualitative constructs. To address methodological rigor, triangular fuzzy numbers were assigned to linguistic variables based on the frameworks proposed by Chen and Hwang (1992) and Kahraman et al. (2004). Instead of using uniform values for all linguistic terms, differentiated and increasing numerical ranges were applied along the spectrum from "Strongly Disagree" to "Strongly Agree" in order to maintain the precision of the fuzzy analysis and ensure alignment with fuzzy logic standards (Table 1).

Table 1. Linguistic expressions and Fuzzy Delphi values

Linguistic expressions	Fuzzy Delphi values
Totally agree	0.75, 1.00, 1.00
Agree	0.50, 0.75, 1.00
No opinion	0.25, 0.50, 0.75
Disagree	0.00, 0.25, 0.50
Totally disagree	0.00, 0.00, 0.25
Source: Adapted from Chen and Hwang (1992) and Kahraman et al. (2004)	

1. Confirming and screening variables: Regarding the numerical threshold of S = 0.7, it is important to note that this value is determined based on established studies in the field of fuzzy Delphi and the principles of expert consensus. Specifically, in cases where the number of variables is large and the range of expert opinions is wide, a threshold of 0.7 is considered an acceptable level of convergence and agreement among expert panel members (Cheng & Lin, 2002). In the present study as well given the nature of the topic and the data analysis conducted using PLS software the choice of this threshold is deemed both logical and methodologically sound.
After achieving consensus through the fuzzy Delphi process, the selected variables were validated within a structural model using the Partial Least Squares (PLS) method.

$$\hat{\tau}_{it} = (a_{ij}, b_{ij}, c_{ij}), \quad i = 1,2,\dots,n \quad j = 1,2,\dots,m \tag{1}$$

$$a_j = \sum \frac{a_{ij}}{n} \tag{2}$$

$$b_j = \sum \frac{b_{ij}}{n} \tag{3}$$

$$c_j = \sum \frac{c_{ij}}{n} \tag{4}$$

Where i is the expert and j is the decision-making variable. The De-fuzzy value of the mean fuzzy value is obtained from equation below:

$$Crisp = \frac{a+b+c}{3} \tag{5}$$

2. **Stage of consensus and completion of fuzzy Delphi:** At this stage, if the difference between the mean values of two consecutive rounds in the Fuzzy Delphi process is less than **0.1**, the process is considered complete (Cheng & Lin, 2002).

After identifying the characterizing, the MAS and sustainability reporting strategies are validated through the partial least squares (PLS) method.

4. Results and Discussion

Thirty-one experts were selected through the snowball sampling method, and interviews were conducted until saturation using the Delphi method. The characteristics of experts are given in Table 2.

The researcher-made questionnaires were distributed among 384 financial managers of stock exchange-listed companies to validate the identified factors.

According to the literature review, the dimensions and indices of the characteristics of the management accounting system and sustainability reporting strategies are identified (Table 4).

Table 2. The demographic characteristics of the study's qualitative samples

Domain	Gender	Education	Number	Academic standing			Mean age (years)	Mean history of working (years)
				Asst. Prof	Assoc. Prof	Prof.		
Academics	Male	Ph.D.	7	3	2	2	38	22
	Female	Ph.D.	14	6	5	3	41	19
Domain	**Gender**	**Education**	**Number**	**Profession**			**Mean age (year)**	**Mean work history (years)**
				Planning	**Accounting**	**Reporting**		
Professional	Male	MSC	6	1	3	2	52	24
		Ph.D.	4	1	2	1	39	17
Total			31	---			42.5	20.5

Ref. Research findings

Table 3. Demographic characteristics of the study's quantitative samples

Gender	Number	Education	Number	Age (years)	Number	History of working (years)	Number
male	321	MSC and lower	169	20-30	36	Less than 5	69
		MSC	121	30-40	89	5-10	146
Female	63	Ph.D.	94	40-50	175	10-20	108
				Over 50	84	Over 20	61
Total	384	Total	384	Total	384	Total	384

Ref. Research findings

Table 4. Characteristics of the MAS based on the sustainability reporting strategies reported in the literature

Dimension	Indices	Ref.
Characteristics of the MAS	Trustiness, relevance, influence, and value of management accounting information	Rapacioli (2014), Kleine and Van Hoff (2017), Kuhnen and Hahn (2017), Soobaroyen (2019), Asogwa (2023), Odonkor et al. (2024) Sohrabi (2014), Pourzmani and Mashayekhi Fard (2015), Nikbakht and Dianati Deilmi (2015), Tahmasbi-Vand (2016), Masoumi et al. (2017), Ahmadzadeh et al. (2023).
Sustainability reporting strategies	A strategy based on the knowledge management (KM) and intellectual capital (IC) approach, emphasizing sustainability information in decision-making, aligning the organization's strategic goals with sustainable development goals, formulating sustainability principles and standards, developing integrated systems, creating a sustainability and social responsibility committee, specifying the institution responsible for sustainability, establishing an internal control system and effective reporting, introducing and training the category of sustainability, working with novel technologies	Horisch et al. (2014), Alvareza and Ortas (2017), Uyar (2020), Nartey. and Van der Poll (2021), Osogwa (2023), Pramono et al. (2023), Odonkor et al. (2024), Dari (2015), Diyanti Dilami et al. (2015), Bahri Tahal and Rezaei (2016), Fakhari et al. (2017), Setayesh and Mehtari (2018), Abbasi Estmal et al. (2021), Ahmadzadeh et al. (2023), Rostami Jaz and colleagues (2022)

Table 5. Characteristics of the MAS and sustainable reporting strategies

Dimension	Indices	Symbol	Mean Fuzzy	Mean de-fuzzy	Accept/reject
Characteristics of the MAS	Trust in management accounting information	MA1	1, 0.92, 0.3	0.74	Accept
	Relevance of management accounting information	MA2	1, 0.86, 0.3	0.72	Accept
	Influence of management accounting system	MA3	1, 0.83, 0.3	0.71	Accept
	Value of management accounting system	MA4	1, 0.84, 0.6	0.82	Accept
Sustainability reporting strategies	Intellectual capital-based strategies	SR1	1, 0.96, 0.7	0.88	Accept
	Importance of sustainability information in decision-making	---	1, 0.89, 0	0.63	Reject
	Aligning the organization's strategic goals with sustainable development	SR2	1, 0.83, 0.5	0.77	Accept

Dimension	Indices	Symbol	Mean Fuzzy	Mean de-fuzzy	Accept/reject
	Compiling sustainability principles and standards	SR3	1, 0.95, 0.3	0.75	Accept
	Establishing integrated systems	---	1, 0.89, 0	0.63	Reject
	Specifying the entity responsible for sustainability	SR4	1, 0.92, 0.3	0.74	Accept
	Establishing internal control system and effective reporting	SR5	1, 0.86, 0.3	0.72	Accept
	Introducing and educating the category of sustainability	SR6	1, 0.83, 0.3	0.71	Accept
	Using novel technologies	SR7	1, 0.84, 0.6	0.82	Accept
	Establishing sustainability committee and social responsibility	---	1, 0.89, 0	0.63	Reject

Ref. Research findings

After collecting the responses of the experts, the data obtained were analyzed through the fuzzy Delphi method. As such, the factors with average de-fuzzy values of less than 0.7 were rejected, while those with average de-fuzzy values of 0.7 and more were accepted (Table 5).

According to the opinions of experts (Table 4), of all 14 identified factors, 11 were identified as characteristics of the MAS and sustainable reporting strategies. After analyzing the opinions of experts, the conceptual model of the link between the characteristics of the MAS and sustainability reporting strategies is given in Figure 3.

Then, the identified factors are validated using the Partial Least Squares regression (PLS), and the relationship between them is investigated by t-test.

Characteristics of the MAS	
Influence	
Relevance	MAS
Value	
Trust	Sustainability reporting strategies
	Intellectual capital-based strategies
	Aligning the organization's strategic goals with sustainable development
	Compiling sustainability principles and standards
	Specifying the entity responsible for sustainability
	Establishing internal control system and effective reporting
	Introducing and educating the category of sustainability
	Using novel technologies

Figure 3. A paradigm model of the effect of MAS characteristics on sustainability reporting strategies

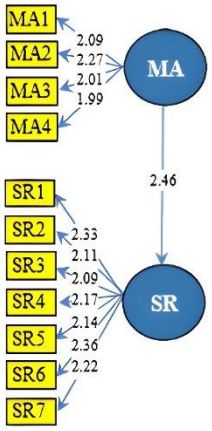

Figure 4. Validation of the paradigm model of the effect of MAS characteristics on sustainability reporting strategies Based on the t-Test

Based on the results of the t-test shown in Figure 4, it can be inferred that each feature of the management accounting system has a statistically significant effect on sustainability reporting strategies. For instance, the indicator "Value of Management Accounting Information (MA4)", with a significant t-statistic and high variance mean, suggests that managers' perception of the added value of accounting information leads to a stronger inclination toward the development of sustainability principles and standards. This relationship may reflect the role of value-oriented information in multidimensional, integrative, and holistic organizational decision-making.

Moreover, the variables "Trust in Information" (MA1) and "Information Penetration" (MA3), by directly influencing the adoption of integrated reporting systems, may contribute to the formation of socially and environmentally responsible structures within firms. Therefore, the findings of the study indicate the presence of specific causal mechanisms between the informational capacities of the management accounting system and the maturity of sustainability strategies.

On the other hand, since a significance level of 0.05 was considered in this study, the relationship between variables is deemed significant if the t-value exceeds 1.96. According to the results, all measurement indicators in the model have t-statistics greater than the critical value, and thus the observed correlations are statistically significant.

Additionally, given the positive values of Q^2 statistics, it can be concluded that the model has predictive capability for changes in the dependent variable. Furthermore, to assess the model's reliability, four statistical tests were employed, and their results are presented in Table 6.

Cronbach's Alpha values for each variable should exceed 0.7. The results of the Cronbach's alpha test for the research model, presented in Table 5, indicate that all Cronbach's alpha coefficients are above 0.7. Therefore, reliability based on this test is confirmed. Internal consistency, which refers to the correlation among items within a variable (i.e., within the model), is also known as reliability. Within the model, factor loadings and Composite Reliability (CR) affect the correlation among items. Factor loadings, measurement errors, path coefficients, and other parameters influence the inter-item correlations. Thus, the most important reliability test is composite reliability because it assesses the relationship among items based on model components.

For a newly developed model (such as the present research model), a CR value greater than 0.6 is considered acceptable, whereas for mature models (those extensively validated), a CR between 0.7 and 0.95 is deemed good. In this study, all composite reliability coefficients exceed 0.7; hence, reliability based on this criterion is also supported.

Table 6: Cronbach's Alpha Coefficients, Composite Reliability (CR), Spearman Correlation Reliability, and AVE Communal Reliability

No.	Constructs	t-statistic	Q^2 Statistic	Cronbach's Alpha Coefficients	Composite Reliability (CR)	Spearman Correlation Reliability	AVE Communal Reliability
1	MA1	2.09	0.202	0.803	0.851	0.833	0.748
2	MA2	2.27	0.192	0.813	0.862	0.844	0.757
3	MA3	2.01	0.101	0.901	0.955	0.935	0.839
4	MA4	1.99	0.139	0.864	0.916	0.897	0.805
5	SR1	2.33	0.206	0.799	0.847	0.829	0.744
6	SR2	2.11	0.163	0.841	0.891	0.873	0.783
7	SR3	2.09	0.137	0.866	0.918	0.899	0.807
8	SR4	2.17	0.167	0.837	0.887	0.868	0.780
9	SR5	2.14	0.189	0.816	0.865	0.847	0.760
10	SR6	2.36	0.131	0.872	0.924	0.905	0.812
11	SR7	2.22	0.134	0.869	0.921	0.902	0.809

The Spearman's rank correlation coefficient for each construct should be greater than 0.7. The results of this test, shown in Table 5, indicate that all Spearman reliability coefficients exceed 0.7, confirming the model's reliability based on this measure as well.

Convergent validity examines how well each item individually, independent of other items, can generalize and replicate results in other studies. The value for this test should be greater than 0.5. According to the results in Table 6, all constructs' convergent validity coefficients are above 0.5, thereby confirming the convergent validity of the items.

Moreover, to assess the acceptability of the designed model, several fit indices were employed, including the Bentler-Bonett Normed Fit Index (NFI), relative chi-square (χ^2/df), Relative Fit Index (RFI), Incremental Fit Index (IFI), Parsimony Comparative Fit Index (PCFI), and Root Mean Square Residual (RMSR). The results obtained from the model are presented in Table 7.

Table 7. Research model fit indices

Model	NFI	X2/df	RFI	IFI	PCFI	RMSEA
Acceptable range	≥0.09	1-5	>0.6	>0.9	>0.6	<0.1
Calculated	0.96	3.212	0.79	0.98	0.75	0.094

Ref. Research findings

Based on the obtained findings, it appears that the dynamic interaction between the management accounting system and sustainability reporting varies significantly according to differences in institutional requirements and the nature of social-environmental missions across industries. For example, in the petrochemical industry, environmental regulations and the need for accountability to environmental regulatory bodies emphasize the role of carbon data tracking and environmental risk management. In contrast, in industries such as food or automotive, the focus is more on cost optimization or sustainable supply chain management. This suggests that a uniform model would not be effective across all industries, and industry-specific characteristics must be considered in the design and implementation of sustainability reporting systems.

5. Conclusion and future perspective

The sustainable development approach represents an integrated convergence of environmental, social, and economic effectiveness. The distinction between the sustainable development model and the industrial model lies in the fact that the industrial model primarily relies on economic or financial dimensions. Consequently, companies under the industrial model focus on creating financial capital for their stakeholders. Traditional management accounting systems have thus been utilized mainly to achieve economically driven organizational strategies, often overlooking social and environmental strategies. Therefore, this study examined the impact of management accounting system characteristics on sustainability reporting strategies.

The statistical population for identifying factors included academic and professional experts, such as management accounting professors and financial managers of listed companies that provide sustainability reports. They were selected through snowball sampling (n=31). Additionally, the population for validating the identified factors comprised financial managers of listed companies, with the sample size determined by Cochran's formula (n=384). For data analysis, the fuzzy Delphi technique was first employed to identify factors, followed by validation using Structural Equation Modeling (SEM) with Partial Least Squares (PLS) methodology.

The results of the fuzzy Delphi technique, based on expert opinions, revealed that the designed model comprises four main dimensions or indicators: economic factors, socio-legal factors, environmental factors, and internal organizational factors, encompassing 19 sub-indicators. Furthermore, the SEM results confirmed the validity of the identified factors.

The research population for identifying the features of management accounting systems and sustainability reporting strategies included experts from academia and industry management accounting professors and financial managers of listed companies selected by snowball sampling (n=31). For validating the identified features and strategies and examining the relationships among them, the sample included financial managers of listed companies, with the sample size determined by Cochran's formula (n=384). Initially, fuzzy Delphi was utilized to identify the features of management accounting systems and sustainability reporting strategies, followed by SEM using PLS for validation and relational analysis.

The fuzzy Delphi results identified management accounting system features as: influence, relevance,

value, and trust; while sustainability reporting strategies included: aligning organizational strategic goals with sustainable development, developing sustainability principles and standards, defining responsible sustainability entities, establishing internal control systems and effective reporting, raising awareness and training on sustainability, and utilizing new technologies. SEM results showed that these identified features and strategies have sufficient validity, and the management accounting system significantly influences sustainability reporting strategies.

The findings of this study indicate that the characteristics of the management accounting system (relevance, value, influence, and reliability), mediated by informational capacities and environmental management systems (EMA/EMS), lead to sustainability reporting strategies. These results align with the international literature, which demonstrates that dynamic capabilities contribute to environmental innovations and enhanced ESG performance through the strengthening of EMA/EMS (Huang & Xiao, 2023; Xia et al., 2025).

Moreover, the present findings partially confirm the results of Pramono et al. (2023), who investigated the relationship between sustainable management accounting and environmental management systems and their impact on organizational performance in Indonesia's manufacturing sector, concluding that environmental management systems positively affect sustainable management accounting. Additionally, the results align with Yusefizadeh's (2023) findings, which identified eight main organizational factors affecting sustainability reporting, including ownership structure, board of directors, firm size, profitability, financial leverage, corporate governance structure, and regulatory framework. Furthermore, the study corroborates Rostamijaz et al. (2022), who identified the role of organizational characteristics such as size, age, specialized skills, and ownership structure in the relationship between management accounting practices and corporate sustainability.

Ultimately, given the growing global population and consumption alongside resource scarcity, decision-making within companies must shift toward the triple bottom line of sustainable development economic, social, and environmental goals rather than focusing solely on economic objectives. In this context, management accounting, with a sustainability reporting approach as an information system, can play a crucial role in achieving sustainable development goals. The management accounting system can directly influence strategies and the advancement of sustainable management accounting by providing reports on value-added statements, calculating the ratio of value-added to environmental damages and workplace accidents, utilizing qualitative and non-financial information, and integrating management accounting information with sustainability reporting.

This integration aligns actions with organizational sustainable value creation strategies and provides the necessary transparency for integrated sustainability reporting. Emphasizing sustainability information in corporate decision-making and focusing on knowledge-based strategies, intellectual capital, and aligning organizational strategic goals with sustainable development objectives can lead to sustainable outcomes. Achieving this requires shifting the company's goal from shareholder value creation to sustainable stakeholder value creation, incorporating the triple bottom line of environmental, social, and economic sustainable development goals into strategic objectives, and transforming organizational structures toward flexible leadership.

The findings of this study carry important practical implications for corporate managers and policymakers in the fields of accounting and sustainability. Specifically, corporate financial managers should recognize that the adoption of management accounting systems based on value and information relevance not only enhances financial performance but also improves the company's sustainability accountability capacity. Policymakers, in turn, can utilize the proposed model to develop mandatory regulations for sustainability disclosure. Moreover, regulatory bodies such as stock exchanges or audit organizations may employ these findings to design integrated financial–sustainability reporting frameworks. Such initiatives can promote data-driven decision-making, enhance organizational transparency, and strengthen stakeholder trust.

Based on the study's findings, it is essential for financial managers to incorporate sustainability-related information into strategic decision-making processes. It is recommended that these managers establish subsystems within the management accounting structure to facilitate the collection, analysis, and disclosure of Environmental, Social, and Governance (ESG) data, thereby contributing to sustainable value

creation for stakeholders. Financial managers should also adopt an adaptive and forward-looking approach, viewing regulatory requirements, oversight pressures, and social expectations as opportunities for resource optimization, transparency enhancement, and competitive advantage reinforcement.

On the policy side, it is suggested that regulators formulate and implement sustainability reporting standards, mandate disclosure requirements for large corporations, and introduce tax incentives for businesses committed to sustainable development. Establishing national sustainability data banks, designing corporate sustainability performance ranking systems, and developing professional training programs for accountants and financial managers could further support these policies and help institutionalize sustainability-oriented decision-making in the national economy.

Furthermore, it is recommended that the Iranian Audit Organization translate, adapt, and formally publish sustainability reporting standards, enabling companies to align their reporting practices accordingly. The Tehran Stock Exchange is advised to gradually mandate sustainability reporting, beginning with large firms and those in industries with significant environmental impacts, such as the petrochemical sector. Additionally, the Iranian Association of Certified Public Accountants (IACPA) is encouraged to organize specialized training programs to equip partners and managers with the skills necessary for providing assurance on sustainability reports.

For future research, it is advisable to assess the feasibility and implementation of the proposed model within Iran's local institutional and economic contexts, while also aligning it with international standards such as the Global Reporting Initiative (GRI) framework. Nonetheless, a key challenge in generalizing the results lies in the fundamental differences among countries in terms of regulatory, institutional, and legal structures. Therefore, to enhance generalizability, it is crucial to examine the integration of management accounting systems with sustainability reporting structures across diverse regulatory environments using a comparative and international approach. Conducting such studies could pave the way for the development of context-specific yet flexible models that can adapt to varying institutional settings and be applied at regional and transnational levels.

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