Int. J. Nonlinear Anal. Appl. In Press, 1–12
ISSN: 2008-6822 (electronic)
http://dx.doi.org/10.22075/ijnaa.2024.33474.4989

Presenting the model of using management accounting system based on the role of dynamic environment, digital business models and product innovation

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(Communicated by Ali Ebadian)

Abstract

This research aims to present a model of using management accounting systems based on the role of the dynamic environment, digital business models, and product innovation. The statistical population of the research was the managing directors, financial managers, and accountants of the companies admitted to the Tehran Stock Exchange; based on the Morgan table, 387 people were selected as a sample, and the research questionnaire was distributed and collected among them. The information collected by questionnaires was analyzed using structural equation modelling by SPSS24 and SmartPLS3 software. The results showed that the dynamic environment and digital business model have a positive and significant relationship with the use of management accounting systems and product innovation. Product innovation has a mediating and positive role in the relationship between the dynamic environment and the use of the management accounting system. Product innovation has a mediating and positive role in the relationship between the digital business model and the use of the management accounting system. Finally, it can be said that management accounting systems are increasing based on dynamic environments, digital business models, and product innovation in companies listed to the Tehran Stock Exchange.

Keywords: digital business models, dynamic environment, management accounting system, product innovation
2020 MSC: 90B06

1 Introduction

Management accounting practices play a crucial role in shaping the preferences of numerous customers who are consistently inclined toward a company's product innovation. Embracing these techniques provides a sustainable competitive advantage for businesses, enabling them to thrive in a dynamic market environment. Management accounting skills are actively utilised in the business environment, where market intelligence is gathered and evaluated, strategic decisions are made, and competitive strategies are implemented. These criteria are significant in the production sector, where efficiency and cost-effectiveness are competitive tools for achieving growth and profitability.

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Received: March 2024 *Accepted:* May 2024

Management accounting, a new view of knowledge in providing financial and non-financial information for plans and strategic positioning, has gained world fame in recent years. However, there is still a lack of accounting literature and empirical studies in developing countries regarding the use of management accounting information by the board of directors to monitor strategy implementation [22]. Considering the significant changes in the business environment and their effect on decision-making, management accounting has been considered the paradigm of the 21st century. Its responsibility is the strategic management of information systems from the level of data to the level of knowledge and the planning of its application in decision-making. They are planning, controlling, directing, organizing, and participating in managing economic enterprises. This is important based on the argument that with the increase of ambiguous environments, managers need a particular form of management accounting information to support their decisions [26]. Despite the unresolved issues of various changes in management accounting techniques, the change in the environment imposes another demand on the management accounting system, including the necessity of making appropriate changes to maintain effectiveness and efficiency. Changes in management accounting methods are not necessarily limited to introducing and replacing new systems. The change can be in how management accounting is used [28].

Companies cannot survive using traditional costing systems in the new economic environment. They should create a modern cost system with new features that play an important role in management performance. In doing so, they believe they can outperform their competitors. Management accounting is part of the management control systems of the organization to achieve the stated goal [10]. The role of management accounting in organizations has evolved from simple accounting to more participation in decision-making [4, 33]. The current business environment, which is constantly changing, places management accounting in an organizational strategic position and forces it to use more complex management accounting systems with more accurate costing, comprehensive performance evaluation, and value chain analysis, as well as analysis of providing customers and competitors [13]. Organizations need management accountants who use complex methods; for this, they require extensive, accurate, and timely cost information. This is important to examine because companies constantly seek ways to improve their performance. Therefore, managers are drawn to the benefits of creating a functional cost system and using cost data provided through management accounting system methods to improve company performance [17, 29].

Considering that the business environment that governs organizations is never static and is constantly changing and dynamic, management accounting must also be constantly changing to maintain its efficiency and effectiveness and fulfill its responsibility if the gradual evolution of the management accounting system is left behind by the evolution and transformation of the environment governing the current organizations and is not coordinated with these changes. The performance of management accounting will not only be in line with achieving the organization's goals faster and better; Rather, it will slow down or even deviate the organization in reaching its goals [27]. One of the theories often used to explain the changes in management accounting methods is the probability theory. Contingency theory suggests that organizations adopt the structures they place in their specific operating environment. Therefore, management accounting is effective when it is consistent with the organization's environment and strategy [35].

Innovation in the business model has attracted much attention in management literature and among experts. Companies of different sizes or lifetimes, in different industries and geographical locations, are changing their business logic to become providers of services and products that reflect changes in the external environment. Such changes affect the process of changing an existing business model or creating a new business model. The business model is a business logic for creating and attracting value for customers and businesses [11]. The dynamics of management accounting give professional skills to businesses. Management accounting facilitates recording financial affairs and storing, classifying, and sending information in various financial statements. Management accounting must ensure that a business has a valid model for recording business processes. Each company has a business model that sometimes has certainty [5, 32]. Due to the economic characteristics of markets based on customers, transaction costs, changes among consumers and suppliers, and competition in the market, there are requirements for digital business models. Digital business models are used by managers at all levels and by high-level managers to better understand how management accounting processes are affected [16].

The management accounting system transforms the organization's strategy into desirable behaviors and results. Many business managers use the management accounting system to improve and systematize the quality of information obtained from the internal and external business environment. Previous studies have investigated how the design of management accounting systems affects the behavior of organization members and the organization's results. However, very few studies have been done on the variables affecting the management accounting system, especially the organization's and CEOs' external environment. A dynamic environment with uncertain conditions limits managers' ability to make decisions. So, managers try to balance the uncertainty in the decision-making process. For this, managers need a support system to make decisions. This support system can be a management accounting information system. The

amount of information that must be processed between decision-makers for support implies the fundamental role of management accounting. Therefore, it is necessary to consider the effect of a dynamic environment on product innovation strategies and the amount of use of the management accounting information system [18]. The issue discussed in presenting the management accounting system model is based on the role of a dynamic environment, digital business models, and product innovation. In today's business world, rapid changes in the business environment and technological innovations have caused organizations to need management accounting systems that can adapt to these changes. The role of a dynamic environment means that the business environment is changing and evolving, and these changes may cause changes in the methods and processes of the organization. Therefore, the management accounting system should be able to dynamically and quickly adapt to these changes and help the organization to benefit from these changes in the best possible way. Digital business models mean that organizations should be able to implement new business models using digital technologies and the Internet. These models typically involve online platforms, digital services and products, and new business processes. The management accounting system must coordinate effectively with these digital business models and provide the organization with the required financial information. Based on the mentioned materials, the main problem of the present research is to answer the question, what is the role of dynamic environment, digital business models, and product innovation in the model of using management accounting system?

2 Theoretical foundations and research background

Management accounting allows the company to deal with more relevant and accurate information to effectively design its competitive strategies for competitive advantage in the industry. Management accounting is a set of accounting tools that provides accurate and timely information on various aspects of a company's decision-making, including strategic costing, target costing, competitors' accounting, consumer accounting, strategic decision, planning, control, and performance management and evaluation [8, 23]. Management accounting cannot be predicted in a vacuum without considering environmental factors. The review of the background of management accounting and its logical conclusion shows that a set of causes and factors interact in a sequential cycle and affect companies and their information needs, which should be considered in predicting the accounting situation in every society. These factors include political, legal, economic, social, cultural, and technological factors, each of which impacts the future of management accounting [19]. In general, it can be said that information technology will make a significant contribution to the future of most fields, especially management accounting. Examining the results of research and the research of professional associations indicates that due to the numerous and diverse needs in resource management at the micro and macro levels, management accounting is bound to grow and develop to respond to these needs. In recent decades, valuable research has been done on the changing tasks of management accounting and the role of management accountants, and the results indicate that management accounting may lose its suitability for management and other users in some cases. The increased business complexity and significant technological progress have led to the need to develop management accounting [3]. Also, management accounting is a strategy to solve problems related to management accounting paradigms in connection with changes in the business environment. Strategic management accounting bridges management accounting and other organizational functions, especially corporate strategy, marketing, and operational activities. According to the stated content, one of the main features of the new perspective is the presentation of strategy by management accounting to adapt organizations to dynamic environmental factors [25].

The important role of management accounting in providing appropriate information for managers to make decisions has been proven; in this way, management accounting should provide managers with more detailed and extensive information for various decisions using management techniques and other available tools [21]. Digitization is the combined use of digital technologies in everyday life. As a result, using appropriate digital technologies has profound implications for planning and implementing models to help business dynamics. Digitalization will change business enterprises. Companies should adopt digitalization tactics to maintain big goals and compete better [12]. Highly concentrated competition in digitization will create pressure from customers for companies. This can cause rapid changes in industries. Manufacturing companies that change their business based on digital business models benefit from the effects of four variables: strategy, technology, communication, and economic innovation. From this point of view, the impact of digitalization on management accounting practices is important. Therefore, an important issue is to examine the role of the business model on management accounting to improve performance in the future due to the impact of digitalization [16].

The Upper Echelons Theory states that aspects of human nature, such as demographics and psychology, influence top managers' decisions [34]. Specifically, the characteristics of high-ranking managers can be of two types: observable traits and psychological traits related to job-related aspects. Managers' Psychological characteristics include executive values, perceptions, and personality traits. The personality of upstream managers will influence product innovation and complexity. In addition, the personality of top managers will be influenced by the external environment and

dynamic environment from the characteristics of the external environment. The risk-taking personality characteristics of the company's CEO have been neglected in some studies. However, studies in the field of accounting are very limited. In addition, the Upper Echelons Theory points out that the organization's internal and external environment influences top managers' characteristics. However, the combination of an external environment and the dynamics of the environment with personality traits that tend to accept risk and use management accounting system information is less considered [18].

Pramonoa et al. [24], in research titled "The effect of strategic management accounting on strategic supply chain through internal and external orientation," investigated the effect of strategic management accounting on strategic supply chain positioning. This research used the mediating role of internal and external orientations as mediating variables. The findings showed that strategic management accounting significantly affects strategic supply chain positioning. These findings also emphasized the mediating role of internal and external orientations in strengthening the effects of strategic management accounting on the strategic supply chain position.

Schaltegger et al. [31], in research entitled "Corporate sustainability management accounting and multi-level links for sustainability - A systematic review," systematically reviewed the research literature on how to deal with the links with the organization's fields and participation in sustainability developments beyond organizational boundaries in management accounting. The analysis questions the conventional assumption of an internal domain for SMA. It recognizes this as a limiting and problematic assumption in the research literature. Instead, it proposes a multi-level framework of contextual, formative, and transformative contributions for further development of SMA.

Massicotte and Henri [20] did a study entitled "The Use of Management Accounting Information by Boards of Directors to Oversee Strategy Implementation" in governance. Specifically, in this research, the theoretical features of the creation and a measurement model were proposed, which includes the use of budget and financial and non-financial performance indicators by boards of directors to oversee the strategic plan. To develop the measurement tool, the conceptual characteristics of the constructs were created based on a matrix approach that includes the information transmitted by three management accounting methods, along with two theoretical characteristics reflecting boards of directors, that is, monitoring the implementation of the strategic plan and questioning the strategic plan.

Kumarasinghe and Haleem [16], in research titled "The Impact of Digitalization on Business Models with Special Reference to Management Accounting in Small and Medium Enterprises in Colombo District," investigated how the digitalization of small and medium enterprises affects business models and management accounting practices made an impact. This exploratory study was conducted on 155 small and medium companies. The findings showed that strategy, technology, communication, and innovative economy favorably affect the business model. Also, business model practices have a mediating effect on management accounting.

Alyasin and Poorzamani [1], in research entitled "Development of Blockchain Technology Acceptance Model in the Context of Management Accounting Concepts," studied the developed model of Blockchain Technology based on some management accounting concepts, including cost management, innovation, self-efficacy of managers, strategic position and social impact. The research method is a correlational survey among 246 accountants of Tehran Stock Exchange companies and accounting professors, which was addressed using structural equation modeling with the partial least squares (PLS). Research findings have shown that the actual use of blockchain is affected by the desire to use blockchain, which is also affected by the variables of understanding the ease and usefulness of blockchain use, both of which are affected by cost management and the understanding of ease is affected by innovation and self-efficacy. Managers and their understanding of usefulness are affected by social influence.

Karmozdi et al. [15], in the research titled "The paradigm of the economic value of information in management accounting using structural equation modeling," used qualitative (content analysis) and quantitative (SEM) combined methodology in the AMOS environment components such as "Measuring the economic value of data" and "Evaluation of management accounting" and "accounting information system (AIS)." After distributing 312 questionnaires, the sample size was equal to 300 university experts, specialists, and managers working in knowledge enterprises, and professors and students of financial management, IT, and industries were selected with a combination of two methods: purposive non-probability sampling (judgmental sampling) and snowball sampling. The results of the research are that the factor loadings between "The economic value of information representation and display for the organization (A2) and "Measuring the economic value of data" are equal to 77 percent (very significant relationship), between "The economic value of information retrieval and transfer for the organization (A4)" and "Measuring the economic value of data" equal to 92 percent (completely significant relationship), was calculated." "Optimal decision-making to improve the flexibility of the organization (B1)" has the greatest impact on the evaluation of management accounting because their correlation coefficient is equal to 86 percent, and "Reducing organization costs (C1)" has the greatest impact on the accounting information system. Because their correlation coefficient was calculated to be equal to 90

percent. Finally, the correlation based on path analysis between "determining the economic value of information" and "Evaluation of management accounting" based on confirmatory factor analysis loadings is equal to 0.566. The correlation based on path analysis between "Measuring the economic value of data" and "accounting information system" based on confirmatory factor analysis loadings is equal to 0.521.

Mohammadi et al. [22] conducted a study using management accounting information from the board of directors to assess financial and non-financial performance. The research, "Investigating the Use of Management Accounting Information by the Board of Directors on Financial and Non-financial Performance," is a descriptive-correlational survey employing regression equations, representing an applied research approach. Due to its specific time frame, the study is classified as field research for data collection and cross-sectional research. The statistical population of interest comprises all managers and management accountants working in publicly listed companies. The researchers utilized the Morgan table for sampling, with a targeted sample size of 384 participants. Non-random sampling was employed as the sampling method, and standard questionnaires served as the primary research instrument. To ensure the reliability of the findings, the researchers conducted the KMO index and Bartlett test. The structural equation model analysis results indicated a significant positive impact of management accounting information on financial and non-financial performance.

Safarzadeh et al. [30], in research entitled" Reviewing the Dimensions of Management Accounting Service Quality from the Perspective of Internal Managers," examined the dimensions of service quality of management accounting from the perspective of internal managers. The current research is applied in terms of its purpose, a descriptive survey in terms of its method and nature, and terms of the data collection method, it is of the questionnaire type. The statistical sample of this research includes 109 managers of the management accounting unit and 109 senior managers of manufacturing companies active in the stock market. The results showed that the average score of the expectations of management accounting unit managers and senior managers for all the identified service quality dimensions was higher than their observations. On the other hand, the dimensions of service quality (SQ) and service performance (SP) are based on the view of management accounting unit managers and senior managers: appearance, responsiveness, reliability, assurance, and empathy. Also, service performance dimensions provide a better assessment of the quality of management accounting services.

Based on the theoretical foundations of the research and adapted from the research of Liem et al. [18], Kumarasinghe and Haleem [16], and Gatautis et al. [11], the conceptual model of the research was designed according to Figure 1:

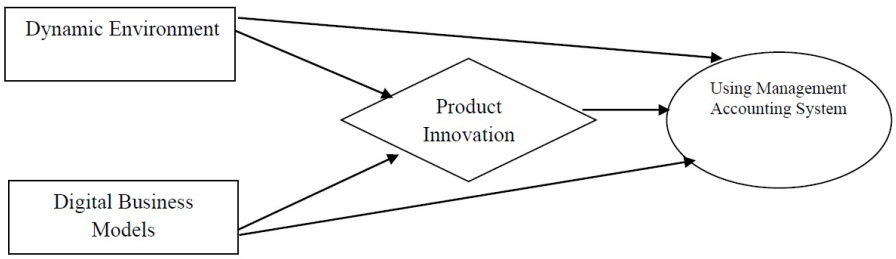

Figure 1: The conceptual model of research [11, 16, 18].

2.1 Research hypotheses

According to the aforementioned theoretical topics, research hypotheses are formulated as follows:

1. Dynamic environments have a significant relationship with management accounting systems.
2. Dynamic environment has a significant relationship with product innovation.
3. Digital business models have a significant relationship with using management accounting systems.
4. Digital business models have a significant relationship with product innovation.
5. Product innovation has a significant relationship with using management accounting systems.
6. Product innovation is mediating the relationship between a dynamic environment and using a management accounting system.
7. Product innovation is mediating the relationship between digital business models and using management accounting systems.

3 Research methodology

This research is applied in terms of purpose and data collection; it is a descriptive survey. Survey research is used to investigate the distribution of characteristics of a statistical population. The purpose of descriptive research is to describe the phenomenon or conditions under investigation. Descriptive research can be used to learn more about existing conditions or to help the decision-making process.

In this research, two methods are used to collect information:

1. **Library method:** The library method is used in all scientific studies, and in some of them, the subject of research is based on the library research method from beginning to end. The researcher's library data collection tool, all printed documents such as books, encyclopedias, magazines, newspapers, weeklies, periodicals, dictionaries, yearbooks, printed interviews, research journals, conference books, journals and textbooks, texts and intranet, and any identifiable printable source.
2. **Field method:** The student enters the field as a researcher and collects information. One of the most common methods in collecting field information is the questionnaire method, which makes it possible to collect information on a large scale. The questionnaire method is usually used in descriptive research and research with a large geographical area or many people in the statistical community and its sample.

The variables of this research were measured by a questionnaire based on the research of Liem et al. [18] and Kumarasinghe and Haleem [16]. Research hypotheses are analyzed by modeling structural equations using SPSS and Smart PLS software, and a graphical structural model is presented in line with the research topic. Smart PLS software also standardized the research tool regarding validity and reliability. Also, an optimal structural model was provided by Smart PLS software. The reliability and validity of the questionnaire are shown in Table 1.

Table 1: Reliability of the questionnaire to measure the variables

Variable	**Research**	**Questions**	**Cronbach's alpha**	**CR**	**Convergent Validity (AVE)**
Dynamic environment	[18]	1 to 4	0.886	0.921	0.745
Digital business models	[16]	7 to 8	0.834	0.889	0.667
Product innovation	[18]	9 to 11	0.853	0.911	0.773
Using the management accounting system	[18]	15 to 24	0.859	0.888	0.544

Variables are more than 0.7, and this index confirms the appropriateness of reliability. The composite reliability values of all studied variables are more than 0.7, and once again, it confirms the appropriateness of the reliability of the variables. In the case of AVE, the critical value is 0.5. This means that the value of AVE greater than 0.5 shows acceptable convergent validity. The Fronell-Larcker criterion is used to check the discriminant validity of the measurement model. Fronell and Larcker [9] state that discriminant validity is acceptable when the AVE for each construct is greater than the shared variance between that construct and other constructs in the model. In PLS, this is checked by a matrix whose rows contain the values of correlation coefficients between constructs and the square root of the AVE values of each construct.

Table 2: Discriminant validity

	Using the management accounting system	**Dynamic environment**	**Digital business models**	**Product innovation**
Using the management accounting system	0.767			
Dynamic environment	0.522	0.863		
Digital business models	0.584	0.433	0.816	
Product innovation	0.507	0.458	0.473	0.879

Based on the results obtained from the correlations and the square root of AVE placed on the diameter of Table 2, the discriminant validity of the model at the construct level can be confirmed in terms of the Fronell and Larcker criterion.

4 Research findings

Table 3 shows the research variables' mean, standard deviation, skewness, and kurtosis. Abbreviated titles of the variables are also introduced in this section.

Table 3: Descriptive statistics related to questionnaire scales

Cases	Code	Mean	Standard Deviation	Skewness	Kurtosis
Dynamic environment	DE	3.52	0.851	-0.616	-0.227
Digital business models	DTM	3.22	0.859	-0.176	-0.372
Product innovation	PA	3.24	0.888	-0.465	0.024
Using the management accounting system	MAS	3.49	0.601	-0.242	-0.223

Table 3 represents the descriptive statistics, including the mean and standard deviation criteria for the variables examined in the questionnaire. The dynamic environment factor has the highest average (3.52), and the digital business model has the lowest average (3.22).

In inferential statistics, the sample criteria are first measured by sampling. Then, with the help of estimation and testing, the results obtained from the sample are generalized and expanded to the entire population. It is generally called inferential statistics when there is talk of inference in statistical topics. The statistical techniques used in every research are based on the importance and necessity of the research to confirm or reject the research hypotheses. This research used factor analysis with the Partial Least Squares method to analyze the data and check the model's fit. The third version of Smart PLS3 software was used to achieve this goal. The results of using this software are expressed in the continuation of the research. Table 4 shows the path coefficients of the relationships of each of the main factors with each other.

Table 4: The path coefficients of the relationships of each of the main factors with each other

The relationships of each factor with sub-factors	Path coefficient	P Values	Result
DE→MAS	0.215	5.247	Significant
DE→CEOR	0.471	10.795	Significant
DE→PA	0.311	5.869	Significant
DTM→MAS	0.214	5.993	Significant
DTM→CEOR	0.262	6.232	Significant
DTM→PA	0.338	6.036	Significant
CEOR→MAS	0.347	8.259	Significant
PA→MAS	0.244	6.353	Significant

After evaluating the measurement model, the structural model is examined by the relationships between the latent variables. Also, this research used the most commonly used indices to fit the structural model. These criteria include significant coefficient (T-values), coefficient of determination (R^2), and the predictive squared correlation coefficient (Q^2). The most basic and the first indicator for measuring the relationship between constructs in the model (structural part) is the significant number of T-values. If these numbers are higher than 1.96, it indicates the validity of the relationship between the constructs and the confirmation of the research hypotheses at the 95% confidence level. In the figure below, the model related to T-values is presented.

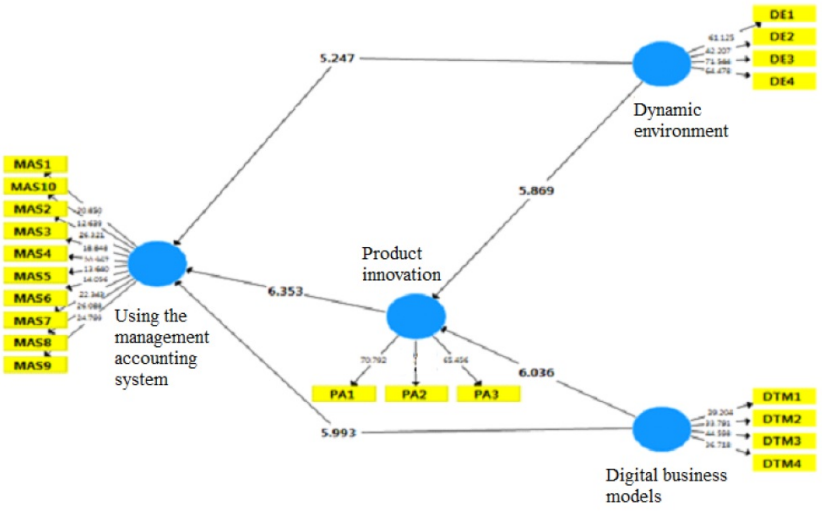

Figure 2: Structural model in the estimation mode of T-values

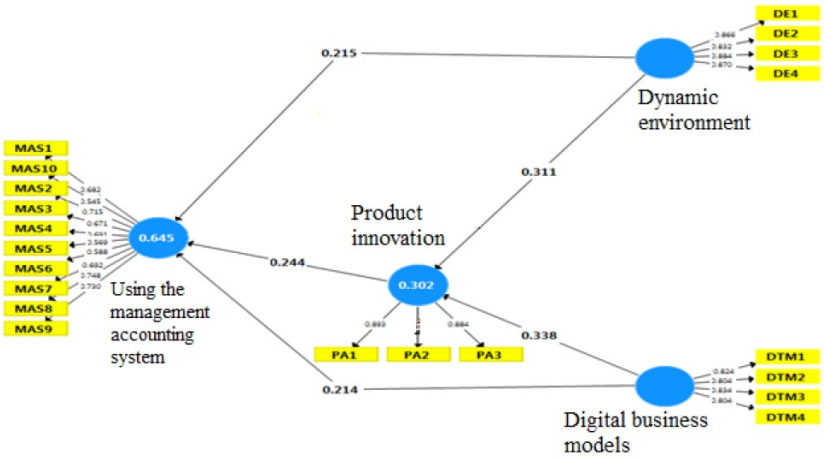

Figure 3: Structural model in standard coefficient estimation mode

The coefficient of determination is a measure used to connect the measurement part and the structural part of structural equation modeling, and it shows the effect of an exogenous variable on an endogenous variable. This value is zero for exogenous variables and is reported only for endogenous variables of the model. The higher the value of R2 related to the endogenous constructs of a model, the better the model fit. Davari and Rezazadeh [7], quoted from Chin [6], introduced three values of 0.19, 0.33, and 0.67 as criteria for weak, medium, and strong values of R^2. The value of R^2 for the endogenous latent variable of the model is presented in Table 5. As can be seen, the model variables have appropriate coefficients of determination values.

Table 5: R^2 values related to the endogenous variable of the model

The relationships of each of the factors together	R^2
Using the management accounting system	0.645
Product innovation	0.302

Models with an acceptable structural fit should be able to predict indicators related to the endogenous constructs of the model. This means that if the relationships between constructs are correctly defined in a model, the constructs can have a sufficient impact on each other's indicators. Thus, the hypotheses will be correctly verified. The value of Q^2 should be calculated for all endogenous constructs of the model. Suppose the value of Q^2 in the case of an endogenous construct becomes zero or less than zero. In that case, it indicates that the relationships between the other constructs of the model and the endogenous construct are not well explained, and as a result, the model needs to be modified. Henseler et al. [14] have determined three values of 0.02, 0.15, and 0.35 for this criterion, which respectively show the weak, medium, and strong predictive power of the model regarding endogenous construct indicators. Table 6 shows the values of Q^2 related to endogenous constructs of the model, which indicates the acceptable fit of the structural model.

Table 6: Q^2 values related to the Endogenous Variable of the model

The relationships of each of the factors together	Q^2
Using the management accounting system	0.318
Dynamic environment	0.536
Digital business models	0.429
Product innovation	0.494

GOF index is used to check the fit of the overall model, which controls both measurement and structural model parts. This criterion was developed by Tenenhaus et al. [2] and is shown in Table 7.

Table 7: Average commonalities and R^2 values

$\overline{R^2}$	$\overline{Communalities}$
0.448	0.421
$GOF = \sqrt{0.448 \times 0.421} = 0.434$	
Three values of 0.01, 0.25, and 0.36 indicate weak, medium, and strong fit.	

Table 7 shows the average values of shared values and the average values of R^2, according to which the GOF value equals 0.434, which shows an acceptable fit.

Hypothesis 1: Examining the effect coefficient of a dynamic environment on using a management accounting system shows that this path coefficient is estimated at 0.215. It is considered that the significance value (t-value) equals 5.247 and is greater than 1.96. The significance level is less than 0.05. It can be concluded that this path coefficient is significant at the error level of 0.05. That is, the dynamic environment has a positive and significant effect on using management accounting systems. By increasing one point in the standard deviation of the dynamic environment scores, we will see an increase in using management accounting system scores by 0.215 standard deviations. Therefore, the dynamic environment will increase the use of a management accounting system. Therefore, according to the collected data, it can be said that the research's first hypothesis that the dynamic environment affects a management accounting system is confirmed with a probability of 95%.

Hypothesis 2: Examining the effect coefficient of the dynamic environment on using a management accounting system shows that this path coefficient is estimated at 0.311. It is considering that the significance value (t-value) equals 5.869 and is greater than 1.96. The significance level is less than 0.05; It can be concluded that this path coefficient is significant at the error level of 0.05. That is, the dynamic environment positively and significantly affects product innovation. By increasing one point in the standard deviation of the dynamic environment scores, we will see an increase in product innovation scores by 0.213 standard deviations. Therefore, a dynamic environment will increase product innovation. Therefore, according to the collected data, it can be said that the second hypothesis of the research, i.e., the effect of a dynamic environment on product innovation, is confirmed with a probability of 95%.

Hypothesis 3: Examining the effect of digital business models on using management accounting systems shows that this path coefficient is estimated at 0.214. It is considered that the significance value (t-value) equals 5.993 and is greater than 1.96. The significance level is less than 0.05; It can be concluded that this path coefficient is significant at the error level of 0.05. This means that digital business models have a positive and significant effect on the use of management accounting systems. With an increase of one point in the standard deviation of the scores of digital business models, we will see an increase in the scores of using the management accounting system by 0.214 standard deviations. Therefore, digital business models will increase the use of management accounting systems. Therefore, according to the collected data, it can be said that the third hypothesis of the research, i.e., the effect of digital business models on using management accounting systems, is confirmed with a probability of 95%.

Hypothesis 4: Examining the effect of digital business models on using management accounting systems shows that this path coefficient is estimated at 0.338. It is considering that the significance value (t-value) equals 6.036 and is greater than 1.96. The significance level is less than 0.05. It can be concluded that this path coefficient is significant at the error level of 0.05. It means that digital business models positively and significantly affect product innovation. By increasing one point in the standard deviation of the digital business model scores, we will see an increase in the scores of product innovation by 0.338 standard deviations. Therefore, digital business models will increase product innovation. Therefore, according to the collected data, it can be said that the fourth hypothesis of the research, i.e., the effect of digital business models on product innovation, is confirmed with a probability of 95%.

Hypothesis 5: Examining the effect of product innovation on using the management accounting system shows that this path coefficient is estimated at 0.244. The significance value (t-value) equals 6.353 and is greater than 1.96. The significance level is less than 0.05. It can be concluded that this path coefficient is significant at the error level of 0.05. Product innovation has a positive and significant effect on the use of management accounting systems. By increasing one point in the standard deviation of the product innovation scores, we will see an increase in using management accounting system scores by 0.244 standard deviations. Therefore, product innovation will increase using the management accounting system. Hence, according to the collected data, it can be said that the fifth hypothesis of the research, i.e., the effect of product innovation on using a management accounting system, is confirmed with a probability of 95%.

Hypothesis 6: As can be seen, the effect of the dynamic environment variable on product innovation was confirmed with a path coefficient of 0.311 and a t-statistic value of 5.869. The effect of product innovation on using a management accounting system was also confirmed with a path coefficient of 0.244 and a t-statistic value of 6.353. According to the test of these two paths in the form of a model, it can be concluded that the product innovation variable plays a mediating role in the influence of the dynamic environment on the use of a management accounting system. On the other hand, considering that the absolute value of the Sobel statistic is equal to 4.565 and is greater than 1.96, and the significance level of the test (0.000) is lower than the error level of 0.05, it can be found at the confidence level of 95, the mediating effect of product innovation in the relationship between dynamic environment and using management accounting system is confirmed once again. Therefore, the sixth research hypothesis is confirmed.

Hypothesis 7: As can be seen, the effect of the digital business models variable on product innovation was confirmed with a path coefficient of 0.338 and a t-statistic value of 6.036. Also, the effect of product innovation on using a management accounting system was confirmed with a path coefficient of 0.244 and a t-statistic value of 6.353. According to the test of these two paths in the form of a model, it can be concluded that the product innovation variable mediates the influence of digital business models on management accounting systems. On the other hand, considering that the absolute value of the Sobel statistic is equal to 4.184 and is greater than 1.96, and the significance level of the test (0.000) is less than the error level of 0.05, it can be found at the confidence level of 95, the mediating effect of product innovation is confirmed in the relationship between digital business models and using management accounting system. Therefore, the seventh hypothesis of the research is confirmed.

5 Results and discussion

Analyzing and reviewing the information collected from the research questionnaires at the 95% confidence level using structural equation modeling showed that the first research hypothesis that a dynamic environment has a significant relationship with using a management accounting system is confirmed at the 95% confidence level. The company's dynamic environment increases the need for accurate and up-to-date information about the company's performance. Management accounting systems can provide this information and thus have a positive and meaningful relationship with the company's dynamic environment. In addition, a management accounting system helps the company to be more accurate and quickly aware of its performance. It can make the best decisions for the growth and development of the company. As a result, using a management accounting system can significantly improve the performance and profitability of the company. Therefore, it can be said that the present research results align with those of studies by Liem et al. [18] and Rezai Dolatabadi and Maher Azin [27]. The second hypothesis that a dynamic environment has a significant relationship with product innovation is confirmed at a 95% confidence level. The company's dynamic environment includes factors such as intense competition, rapid technological changes, and customer needs. This dynamic environment makes companies consider product innovation an essential solution to survive and grow. In this environment, it is very important to have accurate and up-to-date information about the company's performance and the market. The management accounting system helps the company make the best decisions about product innovation by providing this information. In addition, using a management accounting system, the company can reduce its costs and manage its resources more optimally, which can also help product innovation. As a result, the company's dynamic environment has a positive and significant relationship with product innovation. Companies should specifically observe environmental conditions and formulate innovation strategies based on their competitiveness and dynamism to achieve good performance. Therefore, these results align with Liem et al. [18] study. Therefore, it can be noted that the present study's results align with those of Liem et al. [18] and Kumarasinghe and Haleem's [16] studies. The sixth hypothesis of the study, that product innovation has a mediator role in the relationship between dynamic entertainment and using management accounting systems, is confirmed at a 95% confidence level. This is in line with the results of the studies done by Liem et al. [18] and Kumarasinghe and Haleem [16]. The seventh research hypothesis that product innovation plays a mediator role in the relationship between digital business models and using management accounting systems is confirmed at a 95% confidence level. Therefore, it can be noted that the results of the present study are in line with the results of the studies done by Liem et al. [18] and Kumarasinghe and Haleem [16].

Due to the positive relationship between dynamic entertainment and using a management accounting system, managers and administrators of companies listed in the Tehran Stock Exchange are recommended to constantly update the product or service in their industry using management accounting information for future events and plan to expand their production lines. Due to the positive relationship between a dynamic environment and product innovation, managers and administrators of companies listed on the Tehran Stock Exchange are recommended to increase their technology-based products /services in the industry by constantly updating products or services. Due to the positive relationship between digital business models and management accounting systems, managers and administrators of companies listed in the Tehran Stock Exchange are recommended to increase business productivity and performance by reviewing and applying different business models and using management accounting information. Regarding the positive relationship between digital business models and product innovation, managers and administrators of companies listed on the Tehran Stock Exchange are suggested to provide fully innovative products based on customers' commercial needs by increasing the allocated budget to enhance the implementation of business models. Due to the positive relationship between product innovation and using a management accounting system, managers and administrators of companies listed in the Tehran Stock Exchange are recommended to improve their production performance by increasing the production of fully innovative products based on management accounting evaluations. It is recommended that future studies employ semi-structured interviews and quality research methodologies rather than relying

solely on questionnaires. Additionally, future research in the same subject area should consider incorporating mediating variables such as company size, company capital, the hardware and software facilities of the company, and managerial expertise.

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