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## ORIGINAL RESEARCH ARTICLE

# The Research Future of Management Accounting Based on Data-Based Systems

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## ABSTRACT

The purpose of this research was to explore the future of management accounting, specifically focusing on data-based systems, using a structural analysis approach. The study aimed to provide insights into the field by projecting trends and developments up to the year 2030.

This research is exploratory in terms of its purpose and application. The participants were 20 experts in the accounting profession who were selected using purposive judgmental sampling. The data processing involved the use of the structural interaction analysis method and the MICMAC software. According to the findings of the structural analysis of business globalization, the key drivers include the convergence of accounting and business, the relationship between industry and university in management accounting, the increase of academic experts, and the rapid pace of technological and business intelligence changes. They have an impact on improving the quality and quantity of companies' profits in the future of the management accounting profession by 2030. The results show that these drivers play a crucial and highly effective role in enhancing the future profitability of companies in various sectors within the management accounting profession.

This finding can be valuable for management accounting policymakers to anticipate future developments in this profession and avoid being caught off guard. ©authors

## 1. Introduction

Management accountants utilize data analytics to generate value and can have a significant impact on various aspects such as enhanced efficiency, increased profitability, and improved cash flow. They also play a crucial role in customer management, fostering innovation, and protecting intellectual property. All this data is not only about focusing on new target opportunities but also about internal value drivers (Mennati et al., 2022). Examples of activities that management accountants can perform using data analytics (depending on the size and scope of the organization) include inventory management, production planning, error rates, quality assurance, procurement, market segmentation, price optimization, and resource management (Wadan et al., 2020).

Management accounting is a data-oriented method that analyzes the situation based on available data and also identifies knowledge deficiencies within the organization (Salman Zadeh et al., 2022). In recent decades, companies and business units have faced increasing competition in the business environment, which has underscored the importance of data analysis. In competitive conditions, the importance of information and accurate and timely decision-making plays a fundamental role in the success or failure of businesses (Posadzińska et al., 2022).

In this situation, management accounting can effectively contribute to the decision-making process in economic enterprises by generating valuable insights and providing a comprehensive range of relevant and timely information (Mehrbanpour, Ghorbani & Jandaghiqami, 2016; Sule, Yusof & Bahador, 2019). The primary objective of management accounting is to enhance its role in the organizational management process by collecting, processing, and disseminating information and generating practical knowledge (Hilton, 1999). Management accounting professionals, who possess advanced data mining skills and the ability to develop predictive algorithms, strive to establish a competitive advantage for the organization through the utilization of

management accounting techniques (Van Dijck, 2014).

This is a highly specialized field, and determining the necessary inputs and outputs of the organization through the management accounting process is a crucial matter.

Management accountants ideally determine the organization's needs based on data to support the organization because they have a comprehensive view of the organization and its existing information systems (Tajvidi et al., 2020).

Determining the areas that an organization should monitor is based on data analysis from the perspective of management accounting specialists (Bhimani, 2020).

At the beginning of the 20th century, management accounting was primarily utilized as an information tool to provide insights into the company's short-term valuation and the immediate value generated (Rouwelaar et al., 2021). In the second half of the 20th century, companies became aware of the importance of macro factors affecting their activities, and the significance of utilizing management accounting services became more apparent to them. Consequently, this created the necessary motivation for management accountants to participate in decision-making with the goal of benefiting society as a whole (Haghighat Shahrestani et al., 2021).

The developments in management accounting have provided a necessary platform for conducting further research on the use of management accounting procedures to analyze financial and economic data, as well as management in organizations (Ratnatunga, Tse & Wahyuni, 2015). However, these developments have not led to investigations of management accounting applications in organizations. The existing literature has primarily focused on gaining a better understanding of the management accounting profession itself (Messner, 2016).

On the other hand, studies show that the state of management accounting is not favorable, and in order to improve it in the future, greater efforts should be made (Babajani, Ghorbanizadeh, & Khonkha, 2019). On the other hand, management

accounting has not only failed to make significant progress, but it is also very limited.

Meanwhile, the role of management accountants is influenced by various macro factors.

New techniques and information technology have significantly influenced the performance and role of management accountants (Jack, L., & Kholeif, 2008). Knowledge of big data analysis and managerial situational analysis should be considered key skills for any accountant.

According to Pierce & O'Dea (2003), management accounting has been constantly changing due to turbulent economic conditions and ambiguous demands and expectations of stakeholders. Therefore, the role of management accountants has evolved from simply collecting and reporting information to now encompass interpreting information and offering advice to managers. Today, we recognize that management accountants play a significant role in the decision-making process and strategy formulation (Ma & Tayles, 2009). In various situations, management accountants are attempting to assume new roles and responsibilities in response to the changes (Morales, J., & Lambert, 2013).

Neglecting management accounting procedures in the future can lead to significant deviations in the level of executive practices and procedures within this profession. Irvine, Moerman & Rudkin (2010) examined the challenges faced by university educators in the field of management accounting. They stated that these challenges cannot be resolved until innovative tools are developed in the long term to address the current and future shortage of university educators.

Management scholars have addressed the management of big data in management and explored and how the analytical tools provided by data science can be adapted utilized. changed. To not only seek better answers to existing questions but also to pose new questions (Al-Htaybat et al., 2017).

Management accountants should be prepared to meet the demands of managers and participate more directly in the decision-making process. They should also strive to create added value in the company in

accordance with the developments in the field of management accounting duties.

It is important to recognize the significance of data-oriented management accounting trends in the future. On the other hand, in the process of globalization, competition among companies is inevitable. For this purpose, it is absolutely necessary to have efficient and capable management accountants who can advise and guide managers.

Management accountants should be responsible for adequately preparing themselves to offer the services required by managers. This involves carefully and intelligently planning and identifying recurring and unforeseen patterns in organizational data. To achieve this, they must move forward with deliberate foresight and a well-thought-out plan. And it is proportional to the progress and development of society.

In addition, the business environment is rapidly changing and evolving. In order to stay competitive in this dynamic landscape, it is crucial to make accurate and timely decisions. This necessitates the presence of accurate, relevant, and reliable management accounting. As one of the primary sources of information for management, management accounting should adapt and evolve with the latest developments and advancements.

Therefore, this research seeks to answer the question: What is the future of management accounting research based on data-driven systems?

## **2. Literature Review**

### ***2.1. Management accounting***

Management accounting is defined as the application of accounting and financial management principles to generate, maintain, protect, and enhance value for stakeholders in both for-profit and non-profit organizations in the public and private sectors (Rajeevan, 2019). The emergence of management accounting dates back to the industrial revolution, which began in the 18th century in the West. In that period, textile factories, railways, and steel factories used to assess their costs in financial years in order to gauge their efficiency. In the middle of the 19th century, a group of engineers led by Taylor,

who was one of the pioneers of management in the industrial era, established standards to determine cost-effectiveness. In the 20th century, various companies presented different methods of cost management by analyzing the components of the cost ratio. In the second half of the 20th century, accounting and auditing standards, financial statements, the establishment of the stock market, and regulatory requirements for the accounting profession were developed and consolidated. But this process was halted due to the impact of the oil shock and economic recession of the 1970s. However, the emergence of liberalism brought about a new development in accounting management. Because of neoliberalism, organizations are compelled to offer a wide range of products and services that are both high in quality and low in cost, in order to sustain competition. In this regard, the complexity, variety, and speed of the business environment have rendered the current methods of accounting management insufficient to meet the needs and challenges of the modern era of business. Therefore, the calculation of the cost of quality, the cost of targeting, and many new accounting methods have aligned with the modern business world (Salijeni et al., 2020).

### **2.2. Future Research**

Future research, as a discipline, is the practice of embracing the uncertainty of the future and contemplating the potential occurrence of different future scenarios instead of a singular outcome. Future research informs about various potential futures that are never certain and are always filled with anticipation due to the possibility of unexpected events (Taghilo et al., 2015). In this regard, one of the most important future research methods is scenario writing.

Planning based on scenarios offers a way to embrace and navigate uncertainties (by exploring alternative futures) and provide guidance and leadership in complex situations (by harnessing the power of storytelling). The purpose of scenario planning is not to predict the future or provide an accurate picture of the future. Instead, it helps to make better decisions by examining the factors that potentially affect the future.

The main purpose of scenario creation and scenarios is to empower decision-makers to discover and examine all or some of the possible future states in order to strategize present actions and anticipate their future outcomes.

Therefore, decision-makers should refrain from taking strategic actions before engaging in strategic thinking (Mousavi and Kohki, 2016). It is evident that incorporating the framework of scenarios, taking into account key factors and identified trends, can be applied in any field. Therefore, in each scenario, attention should be paid to the main factors and trends (Azer et al., 2013). Many types of research have been conducted on management accounting, and this research mentions a number of studies that have been conducted.

### **2.3. Data-Based System**

A data-driven system is a process that involves collecting data based on measurable objectives or key performance indicators (KPIs), analyzing patterns and facts from this information, and using them to develop strategies and activities that benefit the business in various areas. It will work (Biggio et al., 2021).

Qualitative analysis focuses on data that is not defined by numbers or specific criteria, such as interviews, films, and anecdotes. Qualitative data analysis is based on observation rather than measurement. In this type of analysis, coding the data is critical to ensure that groups are systematically and intelligently grouped (Belayneh et al., 2022).

Quantitative data analysis focuses on numbers and statistics. Descriptive statistics, such as the average and standard deviation, play a central role here. This type of analysis is quantitative rather than qualitative. Quantitative and qualitative data must be analyzed to make smarter, data-driven decisions (Ferrettini et al., 2022).

The importance of data in decision-making depends on stability and continuous growth. This enables companies to create new business opportunities, increase revenue, forecast future trends, optimize current operational efforts, and generate actionable information (Francia et al., 2022).

### **2.4. digital technology**

Andreassen (2020) examined the impact of digital technology on changing roles and concluded that it contributes to competition between professions. It also influences the behavior and expectations of decision-makers towards management accountants, as well as their connection. Additionally, digital technology can serve as a mediator in the identity work of accountants. Also, Xiang and Birt (2021) stated that the disclosure of company information through the Internet has grown significantly worldwide over the past two decades. Melnyk et al. (2020) conducted a study on accounting trends in the modern world. They found that the future trends in accounting include globalization of business and the profession, expansion of digital technologies, expectations from professional accountants, regulations and governance, hard skills, soft skills, and professional flexibility.

Al-Khasawneh, Endut, and Rashid (2020) examined the factors that influence the utilization of modern management accounting technologies in industrial companies. They found that both external factors (such as environmental uncertainty and market competition) and internal factors (including advanced manufacturing technology, differentiation strategy, low-cost strategy, organizational culture, and decentralized organizational structure) have an impact on the adoption of modern management accounting technologies in industrial companies.

Zainuddin and Sulaiman (2016) reported in their research that the management accounting profession in the 21st century faces various challenges related to the business environment, globalization, customer focus, and the rapid pace of technological advancements, changes in business practices, and hierarchical structures. - Axis is a world-class production company that specializes in inter-company e-commerce and company-to-customer business. They focus on inventory cost reduction and value chain management. They also provide management accounting tools, modeling, activity-based pricing, company resource planning, balanced evaluation cards,

target pricing, supply chain management, and a just-in-time production system.

Odar, Kavčič & Jerman (2015) found that the development of management accounting was not in accordance with the theoretical foundations and economic developments. They also noted that the progress of management accounting was slower than that of the economic market, particularly during times of crisis. However, they observed improvement and progress in the accounting system. Management has not occurred.

In another study, Alao (2014) demonstrated that in the past, there was little distinction between management accounting and financial accounting. However, with recent developments, this situation has changed, and the two disciplines have evolved to reflect this difference. On the other hand, a new approach has emerged in management accounting, where management accountants are now tasked with decision-making, value creation, and achieving organizational goals. Therefore, developing countries need management accountants for effective and outcome-driven management of limited resources. Previously, Voipio (2014) concluded in his research that the most significant and influential obstacle to changing the role of management accountants in the future is the organizational role change program. Additionally, the update program has not been successful in altering the organizational role of management accountants.

Babajani et al. (2019) conducted a study on the future of management accounting from the perspective of education and research. They found that the current state of management accounting is unfavorable and concluded that double efforts should be made to improve its future. According to experts in the field of fuzzy Delphi, the crisis in education and research is considered the most significant driving force for the future. This suggests that the state of education and research is currently chaotic and will continue to be so. The experts have confirmed that this situation is indeed a crisis. The relationship between universities and industries is of great importance, indicating that in the future, universities will make even greater efforts to

improve their relations with industries. Mohammadzadeh Salateh & Laithi (2018) by examining the future of the accounting profession in the public sector with the scenario analysis method, found that law enforcers will play the main and most effective role in the future of the accounting profession in the public sector, which leads to an increase in legal risks and the responsibilities of the profession of accountants. The inclination to attract and hire experts in the public sector will align with the need for accountability, aided by the advantages of new technologies. Babajani, Barzideh, & Khonkha (2017) with the future study of management accounting: from the point of view of science and information technology, they came to the conclusion that the management accounting situation is not favorable and according to the experts, the development of intelligent accounting software and systems will be the most important drivers and it means This means that in the future, technology will penetrate accounting systems and accounting systems will become intelligent. Also, business intelligence is in second place, while the expansion of personal technologies and cloud computing in businesses is tied for third place. Babajani and Khonkha (2016) identified and macro-analyzed trends that will impact the future of management accounting from the perspectives of professions and businesses. Their research approach focused on future trends and revealed that the increasing demand for management accounting and the need to strike a balance between financial accounting and management accounting are the most significant driving forces. They expect that management accounting will play a crucial role in the future. Also, the drivers of increasing customer expectations and customer orientation, as well as the growing demand for management accounting specialists, are in the forefront. All the drivers identified, except for the bureaucratic driver

and the administrative flattery system, were confirmed by the experts. Also, Ali & Ahmad (2017) showed that the size of the company, investment opportunities, leverage, and ownership by the general public are among the determining factors of accounting selection policies.

Due to the utilization of the structural analysis approach in this research, which involves examining the state of the system, assessing the impact and effectiveness of the drivers, and identifying key drivers, the research questions are presented as follows.

1. What factors will impact the future of management accounting by 2030?
- 2- Will the status of factors affecting management accounting be stable or unstable in the horizon of 2030?
- 3- How do the factors affecting management accounting impact the field in the year 2030?
- 4- What are the key drivers that will effectively impact the qualitative and quantitative improvement of companies' profits in the future of management accounting by 2030?

### 3. Methodology

This research serves a practical purpose. It is also exploratory in nature and is carried out based on future research methods. The documentary study method and Delphi method have been used to develop effective strategies for the future of management accounting. The selection of the Delphi team was based on a purposive sampling method. The selection criteria for experts included theoretical expertise, practical experience, willingness, and ability to participate in research, as well as accessibility. The number of experts participating in Delphi is usually fewer than 50 people and typically between 15 and 20 people (Powell, 2003; Landita, 2006). According to this criterion, 20 experts and specialists from academic and research centers were selected to participate in the research in 2019.

*Table 1. Demographic characteristics of the research participants*

Variable	Categories	Frequency	Frequency Percent
Education	Masters	8	0.40%
	P.H.D	12	0.60%
	Less than 10 years	7	0.35%

Work Experience	11 to 20 years	8	0.40%
	More than 20 years	5	0.25%
Activity	University	7	0.35%
	Public sector auditor	13	0.65%

In information processing, the Structural Interaction Analysis Method (SIAM) was utilized in the MICMAC software. As a result of monitoring variables, 26 primary drivers in 4 dimensions (science and information technology, education and research, business profession, and economic and political environment) have been identified and

clustered based on library studies (see Table 2).

The Delphi method has been used to screen and evaluate the identified factors, while the interpretive structural model method has been employed to analyze the relationships between these factors.

**Table 2. Drivers affecting the future of management accounting**

General dimensions	Primary drivers
Information science and technology	Var01. Increasing cyber security challenges in business, Var02. Software development and intelligent accounting, Var03. Having technology-based accounting skills, Var04. Speed of changes in technology, Var05. Business Intelligence, Var06. Use of cloud computing
Education and Research	Var07. The relationship between the industry and the university in the field of management accounting, Var08. Increasing interdisciplinary concepts in headlines, Var09. Increasing Academic Professionals, Var10. Increasing the number of professional associations
Business profession	Var11. Variability of stakeholder expectations, Var12. Customer-oriented, Var13. Convergence of accounting and business, Var14. Business Complexity, Var15. Changing the business structure and business patterns, Var16. Increased competition with the entry of outsiders, Var17. Globalization of Business, Var18. Change in labor force balance, Var19. Advisory role of auditors, Var20. Complexity of rules
Economic and political environment	Var21. Economic recession, Var22. Exercising Control over the Auditing Profession, Var23. Economic transparency, Var24. Privatization, Var25. Iran's economic sanctions, Var26. Knowledge-based economy

**4. Findings**

**General analysis of the system environment**

Table No. 3 presents the findings of a study on the interrelationships among 26 drivers that impact the future of management accounting. The study utilized a 26x26 matrix to analyze these drivers across four main dimensions: science and information technology, education and research, business profession, and economic and political environment. The results of this table show that the number of repetitions is two times and the degree of filling is 43.19%. This indicates

that the selected variables have some effect on each other. Out of a total of 676 relationships that can be evaluated in the matrix, 384 relationships are zero. This value indicates that the factors did not affect each other or were not affected by each other. There are 140 relationships with a value of 1 that have a weak influence on each other, while 96 relationships with a value of 2 have relatively strong influencing relationships. In addition, there are 56 relationships with the number 3, indicating that the relationships between key variables are significant and have a strong impact.

**Table 3. Primary analysis of matrix data and mutual effects of variables**

Indicator	size of the matrix	number of repetitions	Number of zero	Number of one	Number of two	Number of three	Total	Degree of filling
Measure	26	2	384	140	96	56	292	43.19%

The matrix of this research is based on the studied engines with 2 rotations and has 100% desirability and optimization, which indicates the high validity of the questionnaire and its answers (Table 4).

**Table 4.** The degree of desirability and optimization of the matrix

Rotation	affecting	effected
1	94%	97%
2	95%	100%

***The degree of affecting and being effected directly of factors on each other***

Table No. 5 ranks the drivers based on their effectiveness in improving company profits in the future of management accounting, considering both qualitative and quantitative factors. It should be noted that the drivers who accumulate the most points demonstrate a change in their effectiveness.

**Table 5.** The degree of direct effects of factors on each other

Rank	Symbol	Variable	Degree of affecting	Rank	Symbol	Variable	Degree of affecting
1	Var17	Globalization of business	940	14	Var20	Complexity of rules	380
2	Var 07	The relationship between the industry and the university in the field of management accounting	860	15	Var02	Software development and intelligent accounting	360
3	Var 04	The speed of changes in technology	720	16	Var15	Changing the business structure and business models	360
4	Var 05	Business intelligence	720	17	Var23	Economic transparency	320
5	Var09	Increasing academic professionals	600	18	Var06	Use of cloud computing	240
6	Var13	Convergence of accounting and business	600	19	Var16	Increasing competition with the entry of people from outside the profession	200
7	Var03	Having technology-based accounting skills	500	20	Var01	Increasing cyber security challenges in business	160
8	Var19	Advisory role of auditors	440	21	Var26	Knowledge-based economy	140
9	Var08	Increasing interdisciplinary concepts in the headings	400	22	Var12	Customer Orientation	120
10	Var14	Business complexity	400	23	Var11	Diversity of stakeholder expectations	100
11	Var21	Downturn	400	24	Var22	Exercising control over the auditing profession	100
12	Var25	Iran's economic sanctions	400	25	Var18	Changing the balance of the workforce	80
13	Var10	Increasing the number of professional associations	380	26	Var24	Privatization	80

***Evaluating the effectiveness and effectiveness of variables***

The distribution and arrangement of variables in the scatter plot indicate the level of stability or instability of the system. In the field of mutual/structural effects analysis method with MICMAC software, two types of distributions are defined, known as stable systems and unstable systems. In the stable system model, the distribution of variables follows a bell-shaped curve. In this model, some variables exhibit high efficiency while others demonstrate low efficiency. In unstable systems, the situation becomes more complicated. In such systems, the forces in question are dispersed along the diagonal axis

of the plane. In most cases, these systems exhibit an intermediate level of effectiveness, making it challenging to identify the key variables (Arcade et al., 2003). What can be understood from the state of the scattering page of drivers affecting the future of accounting is the instability of the system. Most of the variables are scattered along the diagonal axis of the plane. Except for a few variables that have a significant impact on the system, the remaining variables exhibit a similar situation to each other (Figures 1 and 2).

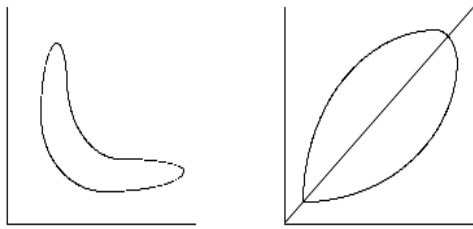


Figure 1. stable system Figure 2. Unstable system

Figure 3 illustrates the distribution pattern of factors that impact the qualitative and quantitative enhancement of companies' profits in the future of management accounting. This scattering pattern generally indicates the condition of an unstable system (Figure 3).

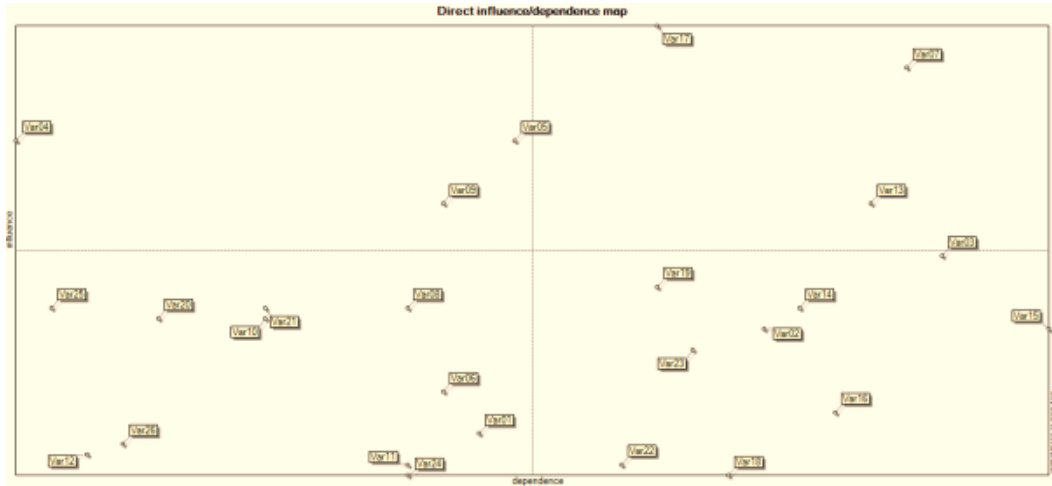


Figure 3. Scattering pattern of factors affecting the qualitative and quantitative improvement of companies' profits in the future of management accounting

**Classification of factors affecting the future of management accounting**

*Determining or influential factors*

These factors vary in their level of influence. Therefore, the system relies heavily on these variables. These factors are displayed in the northwest section of the diagram. The influencing factors are the most critical components because system changes depend on them, and the degree of control over these factors is crucial. On the other hand, these factors are also considered as system input variables. Among the 26 factors examined in this research, several indicators have been identified as drivers that influence the future of management accounting. In this research, the variables considered in this study include the rate of technological advancements, business intelligence, and the growth of academic expertise.

*"Two-way" factors*

These factors act in a highly effective manner simultaneously. These factors are located in the northeastern part of the diagram. The nature of these factors is characterized by instability because every

action and change in one factor leads to a reaction and change in other factors. The factors influencing this area include the globalization of business, the integration of industry and academia in the field of management accounting, and the alignment of accounting and business practices.

*Dual factors consist of two parts: risk drivers and goals.*

**Risk factors:** As depicted in the figure, these factors are situated above the diagonal line in the northeastern region and possess significant potential to emerge as pivotal contributors in the system. The factors of business globalization and the relationship between the industry and the university in the field of management accounting are discussed in this section.

*Target factors*

These factors are located in the northeastern diagonal area of the screen. They are actually the evolutionary outcomes of the system and represent the potential objectives within a system. By manipulating and making changes to these factors, the evolution of the system can be achieved. In this research, the factors

driving the convergence of accounting and business are located in this part.

*Influential factors*

"Influential" factors, or more accurately, "result" drivers, are located in the southeast part of the diagram. They have both low impact and very high impact. Therefore, they are very sensitive to the evolution of influential and two-way drivers, which are output factors. In this research, the factors related to auditors' advisory role, technology-based accounting skills, business complexity, economic transparency, software development, intelligent accounting, changes in business structure and patterns, increased competition from non-professionals, control over the auditing profession, and shifts in the workforce balance are examined in this area.

*Independent or excluded factors:*

These factors have low influence and impact. They are located in the southwestern part of the diagram and appear to have no connection with the system whatsoever. Because they neither hinder a main factor nor contribute to its evolution and progress in the system. Factors such as Iran's economic sanctions, the complexity of laws, the increase in the number of professional associations, economic stagnation, the rise of interdisciplinary concepts in headlines, the shift towards a knowledge-based economy, customer orientation, the use of cloud computing, the diversity of stakeholders' expectations, privatization, and the growing challenges of cyber security in business are all relevant in this area. However, in this category, we should pay attention to two types of engines:

"Discrete" factors: These factors are located close to the coordinate origin on the graph. It is considered that the evolution of these variables is unrelated to the dynamics of the current system and they can be eliminated from the system.

"Secondary leverage" factors: These drivers, despite being completely independent, influence rather than being influenced. They are located in the southwest part of the diagram, above the diagonal line, and can be used as measuring points and benchmarks.

Knowledge-based economy and customer orientation are prevalent in this sector.

*"Adjusting" factors*

These factors are located near the center of gravity of the chart. They can act successively as "secondary levers," "weak targets," and "secondary risk drivers." In this research, no regulatory drivers were identified.

The figure below illustrates the graphical representation of the factors influencing the future of the management accounting system. In these figures, the direct and indirect effects of the engines on other components of the system are specified. The influence of drivers can be categorized as the strongest, strong, medium, weak, and weakest influences.

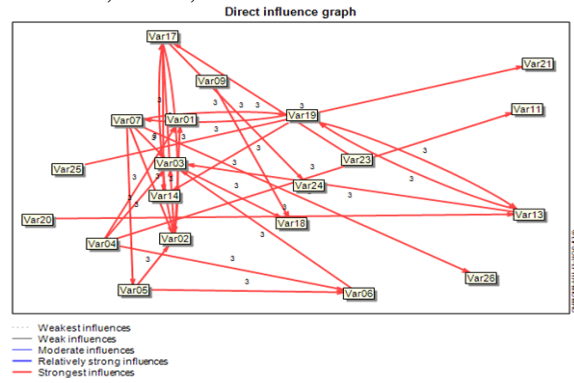


Figure 4. Diagram of the direct effects of the factors (the strongest effect)

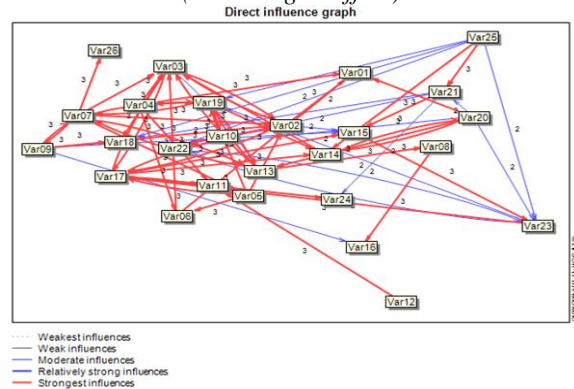


Figure 5. Diagram of direct effects of factors (strong effect)

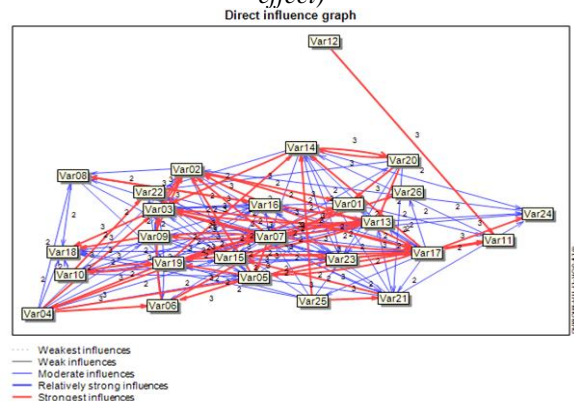


Figure 6. Diagram of direct effects of factors (median effect)

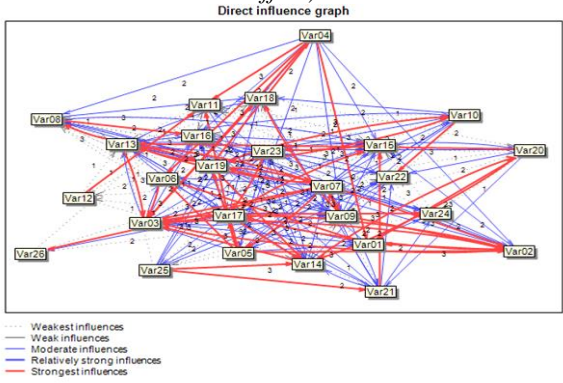


Figure 7. Diagram of direct effects of factors (weak effects)

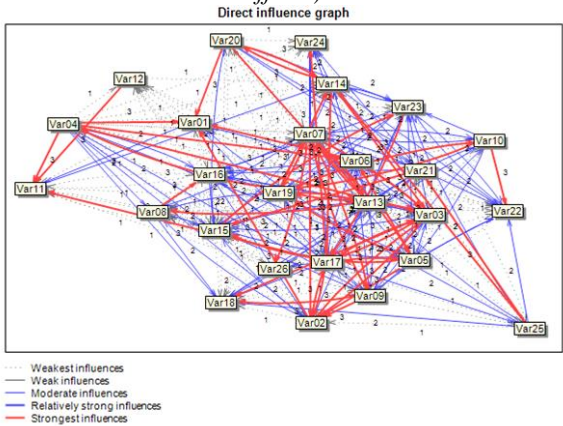


Figure 8. Diagram of direct effects of factors (weakest effect)

Among the 26 drivers examined in this research, 6 key drivers that are effective in improving the qualitative and quantitative aspects of companies' profits in the future of management accounting have been selected.

The most effective key drivers identified in relation to the future of management accounting are business practices, education and research, science, and information technology. These drivers are considered the most effective and essential components of the system. (Table 6).

Table 6. Key drivers affecting the future of management accounting based on data systems (direct and indirect)

Rank	The final score obtained		Category	Variable	Symbol
	Indirect effect	Direct effect			
1	894	940	Business profession	Globalization of business	Var17
2	796	860	Education and Research	The relationship between the industry and the university in the field of management accounting	Var07
3	703	720	Information science and technology	The speed of changes in technology	Var04
4	686	720	Information science and technology	Business intelligence	Var05
5	635	600	Education and Research	Increasing academic professionals	Var09
6	591	600	Business profession	Convergence of accounting and business	Var13

### 5. Discussion

The purpose of this research is to explore the future of management accounting using data-based systems. The results of the research indicate that the dispersion of drivers in terms of mutual effects analysis follows an unstable environmental system. Furthermore, the drivers that impact and influence the future of

the management accounting profession are complex and have intermediate levels of effectiveness. The clustering analysis reveals the concentration of drivers in the area of influential and independent factors. Among the 26 drivers, six key and strategic drivers were identified. These drivers include globalization of business, the connection

between industry and university in the field of management accounting, speed of changes in technology, business intelligence, increase in academic experts, and the convergence of accounting and business. The key drivers for future performance of the management accounting system include both high effectiveness and low effectiveness. As a result, stable drivers control the macro state of the system and its changes. The key driving forces are the input of the development system and the improvement of the company's profit in the future, depending on their performance. The key drivers for the future are found across various dimensions of the business profession, education, research, science, and information technology. The distribution of these drivers is consistent across each dimension.

From a business perspective, it is crucial to consider the globalization of business and the integration of accounting and business in the future of the management accounting profession. This finding is consistent with the results of the study conducted by Melnyk et al. (2020), which examined the globalization of business and the accounting trends in the modern world. It is also in line with the study conducted by Zainuddin & Sulaiman (2016), which highlighted globalization as one of the challenges that lie ahead. They were consistent in being listed in the management accounting profession in the 21st century. Safar and Sarabi (2014) stated that the development of the economic environment, coupled with the expansion of the globalization process, will result in the emergence of large companies with global reach. These conditions create a significant demand for the audit profession to expand and offer a broad range of accreditation and consulting services. As a result, the level of specialization within the industry increases significantly. The document will be audited. In the end, the process of globalization will facilitate the provision of a dynamic and specialized workforce through the expansion of labor markets and the integration of domestic labor markets with international labor markets. On the other hand, in this situation, it is essential to align with the

management audit profession for success in the business field.

Also, from the perspective of science and information technology, it is necessary to pay attention to the rapid pace of technological advancements and business intelligence. This finding is consistent with the results of Andreassen's study (2020) because digital technology was effective in changing the role of management accountants. It is also supported by the study of Melnyk et al. (2020), who highlighted the expansion of digital technologies, and the study of Zainuddin & Sulaiman (2016). Based on the fact that they reported the speed of changes in technology, and the study conducted by Babajani et al. (2017) which identified intelligent accounting systems as the most important drivers influencing the future of this profession, it is evident that the future of management accounting is closely linked to science and information technology. Consonant with Andreassen's (2020) findings, digital technology has been found to enhance competition among professions, particularly in the field of management accounting. However, this technology also influences decision-makers' behavior and their expectations of management accountants. Furthermore, the connection between digital technology and management accountants is of significant importance. According to Saffar and Sarabi (2014), in order to meet the complex needs of clients, audit institutions are compelled to effectively utilize information technology tools to provide services. These circumstances not only impact the role of new technologies in the field of information technology. It will not only promote intelligence, but also foster its creation within the relevant business. With the advent of business intelligence, it is expected that an increasing amount of work will be conducted using computers and new technologies. One of the main reasons for this trend is the significant increase in work efficiency, coupled with a decrease in potential errors. It is therefore not far-fetched to expect that in the future, most work, particularly in the field of management accounting, will shift towards intelligence and automation.

In addition, it is necessary to pay attention to the relationship between the industry and the university in the field of management accounting, as well as the increase of academic specialists, from the perspective of education and research. In this regard, Samkin and Stainbank (2016) demonstrated in their research that universities and accounting professors are currently grappling with the challenge of remaining competitive in an environment characterized by rapid change and movement. To be a player in the field of trade and economy. In order to achieve this goal, theoretical, cognitive, and experimental approaches must be modified, and education and learning are important areas for transformation.

## 6. Conclusion

Big data analysis, utilizing computationally focused methods that prioritize data mining to emphasize pattern recognition and identify unexpected correlations, has the potential to inform the field of accounting research. Management accounting holds a special place due to the significance of organizational data and information storage systems. All professions, including management accounting, need to continuously equip themselves in order to address future changes and developments and serve the public interests and the interests of stakeholders. On the other hand, the future status of any phenomenon depends on numerous factors and conditions. The future of the management accounting profession is no exception to this rule. The results of the research show that the situation of management accounting is not favorable. In order to address this situation, it is crucial to conduct future research and engage in strategic planning. This will help us overcome the crisis, anticipate upcoming trends and developments, and establish an early warning system to effectively handle similar situations in the future. Avoided. Considering the significance of the subject, this research has identified and categorized the key factors that impact the future of the management accounting profession. It is crucial to utilize these variables as a foundation and framework for creating roadmaps and scenarios for the management

accounting system's development. The findings of this research can also strengthen the importance of the relationship between the industry and the university in the field of management accounting, as well as the increase of academic specialists. Of course, these drivers are likely to play a greater role in the future, and other relevant topics will revolve around them in some way. It is also necessary to consider the various factors that contribute to effective drivers of output. These factors include the advisory role of auditors, possessing technology-based accounting skills, business complexity, economic transparency, software development and intelligent accounting, changes in business structure and models, increased competition from individuals outside the profession, maintaining control over the auditing profession, and shifts in the workforce balance. It should be noted that the progress of these results is attributed to the effective and key drivers. If these drivers evolve, the conditions will be created for these outputs to emerge. Adapting from what has been said, it is suggested that policy makers in the management accounting profession change the direction of the unfavorable situation towards a more favorable one. This can be achieved by considering the key drivers outlined in their future plans. Because these drivers play a crucial and impactful role in enhancing the profitability of companies, they are essential for the future of the management accounting profession across various sectors. And since this research did not discuss the trends affecting the management accounting profession, which always play a significant role in explaining the future and its drivers, it is suggested that future researchers investigate the effects of these trends from an economic perspective in a separate study. Social, cultural, political, environmental, etc. It is suggested to equip accounting systems with automatic analysis and troubleshooting processes for data storage, as well as intelligent data mining through digital data processing.

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## References

- Alao, E. M. (2014). A review of the Management Accountant's Role in the effective utilization of organization's resources: Implication for developing countries. *Journal of Economics and Finance*, 5(5), 16-22. <https://doi.org/10.9790/5933-0551622>
- Al-Htaybat, K., & Alberti-Alhtaybat, L. (2017). Big data and corporate reporting: impacts and paradoxes. *Accounting, Auditing and Accountability Journal*, 30(4), 850-873. <https://doi.org/10.1108/AAAJ-07-2015-2139>
- Ali, M. J., & Ahmed, K. (2017). Determinants of accounting policy choices under international accounting standards: Evidence from South Asia. *Accounting Research Journal*, 30(4), 430-446. <https://doi.org/10.1108/ARJ-02-2015-0020>
- Al-Khasawneh, S. M., Endut, W. A., & Rashid, N. M. N. N. M. (2020). Factors Affecting Usage of Modern Management Accounting Techniques in Industrial Companies Listed in Amman Stock Exchange. *International Journal of Research In Commerce and Management Studies (ISSN: 2582-2292)*, 2(3), 14-36.
- Andreassen, R. I. (2020). Digital technology and changing roles: a management accountant's dream or nightmare?. *Journal of Management Control*, 31(3), 209-238. <https://doi.org/10.1007/s00187-020-00303-2>
- Arcade, J., Godet, M., Meunier, F., & Roubelat, F. (2003). Structural Analysis with the MICMAC Method & Actor's Strategy with MACTOR Method. *Futures Research Methodology. Laboratory for Investigation in Prospective and Strategy (LIPS), Paris*.
- Azar, A., Goharifar, M., & Moshabaki, A. (2013). Designing a new model to create a framework for the organization's future scenarios with a scenario planning approach (Case study of Iran Statistics Center). *Organizational Culture Management*, 12(4): 848-831. [in Persian]
- Azar, A., Goharifar, M., & Moshbaki, A. (2013). Designing a new model to create a framework for the organization's future scenarios with a scenario planning approach (case study of Iran Statistics Center). *Organizational Culture Management*, 12(4), 848-831. [in Persian]
- Babajani, J., & Khona, A. (2016). Identification and macro analysis of trends affecting the future of management accounting from the perspective of professions and businesses with a future research approach. *Health Accounting*, 6(2): 24-45.[in Persian]
- Babajani, J., & Khonkha, A. (2016). Identification and macro analysis of trends affecting the future of management accounting from the perspective of professions and businesses with a future research approach. *Health Accounting*, 6(2), 24-45. [in Persian]
- Babajani, J., Barzideh, F., & Khonkha, A. (2017). Future research of management accounting: from the perspective of science and information technology. *Management Accounting*, 11(38): 138-127.[in Persian]
- Babajani, J., Barzideh, F., & Khonkha, A. (2017). Future research of management accounting: from the perspective of science and information technology. *Management Accounting*, 11(38), 138-127. [in Persian]
- Babajani, J., Ghorbanizadeh, V., & Khonkha, A. (2019). The future research of management accounting: from the perspective of education and research. *Experimental researches of accounting*, 9(35), 77-96.
- Babajani, J., Ghorbanizadeh, V., & Khonkha, A. (2019). The future research of management accounting: from the perspective of education and research. *Experimental researches of accounting*, 9(35): 77-96.[in Persian]
- Belayneh, B.T., Augsten, N., Pawlik, M., Böhlen, M. H., & Jensen, C.S. (2022). Speeding up reachability queries in public transport networks using graph partitioning. *Inf. Syst Frontiers* 24(1). <https://doi.org/10.1007/s10796-021-10164-2>.
- Bhimani, A. (2020). *Accounting disrupted: The reshaping of financial intelligence in the new digital era*. New York: Wiley.
- Biggio, B., Diaz, C., Paulheim, H., & Saukh, O. (2021). Big minds sharing their vision on the future of ai (panel). In *Database and expert systems applications (DEXA), LNCS, Vol. 12923*. Springer.

- Ferretini, G., Escriva, E., Aligon, J., Excoffier, J.B., & Soulé-Dupuy, C. (2022). Coalitional strategies for efficient individual prediction explanation. *Inf. Syst Frontiers* 24(1). <https://doi.org/10.1007/s10796-021-10141-9>.
- Flamholtz, E. G., Baiserkeyev, O., Brzezinski, D., Dimitrova, A., Feng, D., Iliev, I., ... & Rudnik, P. (2016). Overcoming Management Accounting Myopia: Broadening the Strategic Focus☆. In *Advances in Management Accounting* (Vol. 27, pp. 73-121). Emerald Group Publishing Limited. <https://doi.org/10.1108/S1474-78712016000027003>
- Francia, M., Marcel, P., Peralta, V., & Rizzi, S. (2022). Enhancing cubes with models to describe multidimensional data. *Inf. Syst Frontiers* 24(1). <https://doi.org/10.1007/s10796-021-10147-3>.
- Haghighat Shahrestani, M., Kheradyar, S., Mohammadi Nodeh, F. (2021). The effect of internal audit effectiveness and quality of financial reporting on information asymmetry between manager and auditor. *Journal of Accounting Advances*, 13(1), 101-129. [In Persian].
- Hilton, R. W. (1999). *Managerial accounting*: Irwin/McGraw-Hill.
- Irvine, H., Moerman, L. and Rudkin, K. (2010). A green drought: the challenge of mentoring for Australian accounting academics. *Accounting Research Journal*, 23(2), 146-171. <https://doi.org/10.1108/10309611011073241>
- Jack, L., & Kholeif, A. (2008). *Enterprise resource planning and a contest to limit the role of management accountants: a strong structuration perspective*. Paper presented at the Accounting Forum. <https://doi.org/10.1016/j.accfor.2007.11.003>
- Landeta, J. (2006). Current validity of the Delphi method in social sciences. *Technological forecasting and social change*, 73(5), 467-482. <https://doi.org/10.1016/j.techfore.2005.09.002>
- Ma, Y., & Tayles, M. (2009). On the emergence of strategic management accounting: an institutional perspective. *Accounting and Business Research*, 39(5), 473-495. <https://doi.org/10.1080/00014788.2009.9663379>
- Melnyk, N., Trachova, D. Y., Kolesnikova, O., Demchuk, O., & Golub, N. (2020). Accounting trends in the modern world. *Independent Journal of Management & Production*, 11(9), 2403-2416. <https://doi.org/10.14807/ijmp.v11i9.1430>
- Mennati, V., & Sasanian, A. (2022). Skills, Influence, and Effectiveness of Management Accountants. *Journal of Accounting Advances*, 14(1), 311-343. doi: 10.22099/jaa.2022.43316.2228
- Messner, M. (2016). Does industry matter? How industry context shapes management accounting practice. *Management Accounting Research*, 31, 103-111. <https://doi.org/10.1016/j.mar.2015.09.001>
- Mohammadzadeh S., & Laithi, A. (2018). The future of the accounting profession in the public sector with the scenario analysis method. *Government Accounting*, 5(2), 109-120. [in Persian]
- Morales, J., & Lambert, C. (2013). Dirty work and the construction of identity. An ethnographic study of management accounting practices. *Accounting, Organizations and Society*, 38(3), 228-244 . <https://doi.org/10.1016/j.aos.2013.04.001>
- Mousoumi, Miranjaf., & Kohki, Fatemeh Sadat. (2016). *Future research in land development (a look at the use of Mic-Mac and Scenario Wizard software)*. First edition, Urmia: Urmia University Press. [in Persian]
- Odar, M., Kavčič, S., & Jerman, M. (2015). The role of a management accounting system in the decision-making process: Evidence from a post-transition economy. *Engineering Economics*, 26(1), 84-92. <https://doi.org/10.5755/j01.ee.26.1.4873>
- Pierce, B., & O'Dea, T. (2003). Management accounting information and the needs of managers: Perceptions of managers and accountants compared. *The British Accounting Review*, 35(3), 257-290. [https://doi.org/10.1016/S0890-8389\(03\)00029-5](https://doi.org/10.1016/S0890-8389(03)00029-5)
- Posadzińska, I., & Grzeszczak, M. (2022). Management Accounting System in the Management of an Intelligent Energy Sector Enterprise. *Energies*, 15(20), 7633. <https://doi.org/10.3390/en15207633>
- Powell, C. (2003). The Delphi technique: myths and realities. *Journal of advanced nursing*, 41(4), 376-382. <https://doi.org/10.1046/j.1365-2648.2003.02537.x>
- Rajeevan, S. (2019). Management accountant's role and society's expectations: Sri Lankan study. *Asian Journal of Accounting Research*. <https://doi.org/10.1108/AJAR-05-2019-0032>

- Ratnatunga, J., Tse, M. S., & Wahyuni, D. (2015). Societal Role Expectations of Management Accounting Professionals: An Australian Study', *Advances in Management Accounting (Advances in Management Accounting, Volume 25)*. In: Emerald Group Publishing Limited. <https://doi.org/10.1108/S1474-787120150000025002>
- Rouwelaar, H., Schaepkens, F., & Widener, S. K. (2021). Skills, influence, and effectiveness of management accountants. *Journal of Management Accounting Research*, 33(2), 211-235. <https://doi.org/10.2308/jmar-18-048>
- Safar, M., & Saberi Sarabi, F. (2014). The future of auditing profession, scenario analysis method. *Auditor*, No. 79, pp. 74-66. [in Persian]
- Safar, Mohammad Javad., and Saberi Sarabi, Farhoud. (2014). The future of auditing profession, scenario analysis method. *Auditor*, No. 79: 74-66.[in Persian]
- Salijeni, G., Samsonova-Taddei, A., & Turley, S. (2019). Big data and changes in audit technology: Contemplating a research agenda. *Accounting and Business Research*,49(1), 95–119. <https://doi.org/10.1080/00014788.2018.1459458>
- Salman Zadeh, H., Kordestani, G., & Kazemi, H. (2022). The Role of Management Accounting in Improving Management Control System in Public Sector. *Iranian Journal of Finance*, 6(1), 54-82. doi: 10.30699/ijf.2021.279013.1211
- Samkin, G., & Stainbank, L. (2016). Teaching and learning: Current and future challenges facing accounting academics, academics, and the development of an agenda for future research. *Meditari Accountancy Research*. <https://doi.org/10.1108/MEDAR-05-2016-0062>
- Sule, S., Yusof, N. Z. M., & Bahador, K. M. K. (2019). Users' Perceptions on Auditors' Responsibilities for Fraud Prevention, Detection and Audit Expectation GAP in Nigeria. *Asian Journal of Economics, Business and Accounting*, 1-10 . <https://doi.org/10.9734/AJEBA/2019/46832>
- Taghilo, A., Soltani, N., & Aftab, A. (2015). Drivers of rural development in Iran. *Space Planning and Design Quarterly*, 20(4),1-28. [in Persian]
- Taghilo, A., Soltani, N., & Aftab, A. (2015). Drivers of rural development in Iran. *Space Planning and Design Quarterly*, 20,(4): 1-28.[in Persian]
- Tajvidi, E., Mohammadi, S. (2020). The role of management accounting information in management control system in large manufacturing companies in iran. *Management Accounting*, 13(46), 1-16. (In Persian).
- Van Dijck, J. (2014). Datafication, dataism and dataveillance: Big data between scientific paradigm and ideology. *Big Data Surveillance*,12(2), 197–208. <https://doi.org/10.24908/ss.v12i2.4776>
- Voipio, J. (2014). *Management accountant's modern role and barriers to role change-Case*. Tech Inc. Master's thesis. Department of Accounting Aalto University School of Business.
- Wadan, R., Teuteberg, F., Bensberg, F., & Buscher, G. (2019). *Understanding the changing role of the management accountant in the age of industry 4.0 in Germany*. In Proceedings of the 52nd Hawaii international conference on system sciences.<https://hdl.handle.net/10125/60017>. <https://doi.org/10.24251/HICSS.2019.702>
- Xiang, Y., & Birt, J. L. (2021). Internet reporting, social media strategy and firm characteristics—an Australian study. *Accounting Research Journal*, 34(1), 43-75. <https://doi.org/10.1108/ARJ-09-2018-0154>
- Zainuddin, Z. N., & Sulaiman, S. (2016). Challenges faced by management accountants in the 21st century. *Procedia Economics and Finance*, 37, 466-470. [https://doi.org/10.1016/S2212-5671\(16\)30153-8](https://doi.org/10.1016/S2212-5671(16)30153-8)