



Review Article

INTEGRATION OF ARTIFICIAL INTELLIGENCE IN MANAGEMENT ACCOUNTING: A SWOT ANALYSIS*

YÖNETİM MUHASEBESİ İLE YAPAY ZEKA ENTEGRASYONU: BİR SWOT ANALİZİ

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ABSTRACT

Today, information is the source of competitive advantage and businesses need to create information architecture that will enable them to make the right decisions in the fastest way. For this reason, it seems inevitable that businesses will reshape their entire business environments in a way that will create far-reaching consequences on business processes and prioritize technological progress by investing in artificial intelligence (AI) applications to create value with better performance. Management accounting is a business function that is central to identifying, collecting, measuring, and analysing data. Therefore, these developments are expected to change management accounting practices and the roles of management accountants within the business. Although it is predicted that the main function of accounting in the future will be to create real-time value for the business by combining management accounting applications with AI, this combination also carries the potential to create significant problems. The purpose of this study is to examine the strengths and weaknesses of the use of AI in management accounting and the opportunities and threats that may arise as a result of this integration with a SWOT analysis.

ÖZ

Günümüzde bilgi, rekabet avantajının kaynağıdır ve işletmelerin en doğru kararları en hızlı şekilde verebilmelerini sağlayacak bilgi mimarileri oluşturmaları gerekmektedir. Bu nedenle işletmelerin, çok da uzak olmayan bir gelecekte iş süreçleri üzerinde geniş kapsamlı sonuçlar yaratacak şekilde tüm iş ortamlarını yeniden şekillendirmeleri, daha iyi performansla değer yaratmak için yapay zeka uygulamalarına yatırım yaparak teknolojik ilerlemeye öncelik vermeleri kaçınılmaz görülmektedir. Yönetim muhasebesi; verileri tanımlamanın, toplamanın, ölçmenin ve analiz etmenin merkezinde yer alan bir fonksiyondur. Dolayısıyla bu gelişmelerin, yönetim muhasebesi uygulamalarını ve yönetim muhasebecilerinin işletme içindeki rollerini büyük ölçüde değiştirmesi beklenmektedir. Gelecekte muhasebenin temel işlevinin, yönetim muhasebesi uygulamalarını yapay zeka ile birleştirerek işletmeye gerçek zamanlı değer yaratmak olacağı öngörülmekle birlikte, bu birleşim önemli sorunlar oluşturma potansiyeli de taşımaktadır. Bu çalışmanın amacı, yönetim muhasebesinde yapay zeka kullanımının güçlü ve zayıf yönlerini ve bu entegrasyon sonucu oluşabilecek fırsatları ve tehditleri bir SWOT analiziyle incelemektir.

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1 | INTRODUCTION

Management accounting is defined by IMA (Institute of Management Accountants) as “a profession that involves partnering in management decision-making, devising planning and performance management systems, and providing expertise in financial reporting and control to assist management in formulation and implementation of an organization's strategy.” The main tasks of management accounting are planning, budgeting, cost management, performance management and internal financial reporting. Therefore, it can be defined as an accounting field for internal users that provides the management information required to make correct business decisions and improve business management (Li et al., 2020; Geddes, 2020; Gärtner & Hiebl, 2018).

Thanks to technological advances, companies now have the opportunity to collect and store a huge amount and variety of data. These developments have escalated the need for technologies that can perform efficient and effective analysis by transforming data into information, and this is where artificial intelligence (AI) comes into play. AI is a machine that uses state-of-the-art techniques to competently perform or imitate cognitive functions performed by the human mind, such as learning and problem solving (Norvig & Russell, 2009). AI is expected to deeply affect the modern business structure and accounting profession (Zhang et al., 2023; Johnson et al., 2021; Rikhardsson & Yigitbasioglu, 2018).

The impact of AI on management accounting practices is still unclear given the early stage of use of these technologies. However, considering that digitalization in management accounting processes provides better access to information and, as a result, transforms the management accounting function into an integrated and interactive structure with other functions of the business (Rom & Rohde, 2007; Granlund & Malmi, 2002), AI is expected to further strengthen this situation. In addition, it seems inevitable that the role of the management accountants within the business will change becoming more strategic, almost consultant-like position (Geddes, 2020; Rikhardsson & Yigitbasioglu, 2018; Caglio, 2003).

In this study, a SWOT analysis is conducted to discuss the strengths and weaknesses of the use of AI technologies in management accounting

practices, as well as the opportunities and threats this integration offers. The strengths are determined as versatile data flow and reduction in costs, while the weaknesses are classified as problems in data quality, bias, users' lack of competence, and design difficulty. The opportunities it offers are identified as smarter decisions and functional and professional transformation, while the threats it poses are determined as loss of control, data security and confidentiality problems, loss of status and decrease in motivation.

2 | ARTIFICIAL INTELLIGENCE AND MANAGEMENT ACCOUNTING

The purpose of corporate existence is to create value, and value creation requires that all business and decision-making processes be structured and managed rationally and efficiently. In this context, the importance of big data is increasing day by day and businesses continue to look for innovative ways to use data in the value creation process.

With the increase in the amount of data, the development and use of AI, especially machine learning techniques, is an important turning point in technology. AI technology is closely related to data analytics. Data analytics is based on questioning data to make predictions, and the basis of AI is deep and high-level predictive analytics (Küçükler, 2023). Deep learning, which is a field of machine learning, is a technology that mimics the way the human brain works and makes inferences using raw data, rather than using predefined patterns and rules. The goal of machine learning is to detect patterns and learn how to make predictions and recommendations by processing data and experiences rather than receiving explicit programming instructions (Nielsen, 2022). The algorithms formed within the system constantly renew themselves and become more and more effective over time by taking into account new data and information included in the system. Deep learning, which works very efficiently with raw data and does not require specialized engineering knowledge, is behind most of the success stories of machine learning. For this reason, companies need to prioritize technological progress by investing in AI applications, especially machine learning, for value creation with increased sales, better customer services, improved business performance and augmented profitability (Ranta et al., 2023; LeCun et al., 2015).

In general, AI reshapes entire business environments in a way that will create far-reaching consequences on the business processes (Ranta et al., 2023). This evolution is expected to greatly change management accounting practices and the roles of management accountants within organizations (Moll & Yigitbasioglu, 2019; Rikhardsson & Yigitbasioglu, 2018; Appelbaum et al., 2017).

3 | SWOT ANALYSIS

The scope of management accounting includes activities that support the decision-making process in businesses. Considering that AI technologies produce results by using internal and external data to support these processes, the necessity of management accounting and AI integration is clearly seen. However, use of AI in management accounting practices is still very limited and there is not enough data on the possible positive or negative consequences of this integration. For this reason, although the strengths and opportunities created by the use of AI technologies in management accounting processes come to the fore, their weaknesses and threats are also significant and must be taken into consideration.

3.1. Strengths

The strengths of using AI in management accounting are discussed under the headings of versatile data flow and reduction in costs.

3.1.1. Versatile Data Flow

Data is the lifeblood of the digitalization process. The amount of global data, which was 33 zettabytes in 2018, is expected to increase to 175 zettabytes in 2025 (Reinsel et al., 2018). With machine learning-based algorithms in AI, useful information hidden in data is revealed and data is transformed into information. In this context, the increase in data brings with it the increase in information along with AI. The pace of data growth provides businesses with the basic framework for comprehensive analytical approaches through machine learning and the successful use of AI. Today, companies utilize data to make their business processes more efficient, strengthen their positions in the markets, enter new markets, increase customer satisfaction, and create new sources of competitive advantage.

Big data refers to the real-time recording of all data internally and externally generated. Internal data refers to data such as reports, records and tables created regarding the activities of the business.

External data comes from sensors in machines, RFID chips in components, clickstream of corporate web site visitors, and digital traces left by people on the websites they browse. It can include almost anything, from private company information to demographic data, from weather data to social media feeds, from satellite images to audio recordings.

Companies obtain valuable information by analysing internal data generated by their operations. However, internally generated information is no longer sufficient, and companies are turning to incorporating new, non-traditional external data into their analyses to an increasing extent.

Globalization requires companies to operate as part of networks consisting of business partners such as suppliers, vendors, channel partners, regulators and other stakeholders that are dispersed globally which can be affected by economic, political and/or environmental factors. Incorporating external data from these networks into analyses can help companies see the risks and opportunities they may miss with internal data from internal operations and limited amounts of external data generated from customers and tier-one suppliers (Schatsky et al., 2019; Nielsen, 2022).

Today, many organizations provide strategic information from external data. An external data platform added as a component to the company's data stack creates a competitive advantage that will increase the company's effectiveness, efficiency, and performance (Nielsen, 2022). The real-time analysis of real-time accessed population data with wide query options is the essence of big data analytics. AI technologies make it possible to create new patterns, correlations and connections in data that have not been detected before (Rikhardsson and Yigitbasioglu, 2018). Companies that leverage external data in their analytics programs appear to outperform their competitors and improve customer acquisition, customer satisfaction, operational efficiency, and risk management (Aaser & McElhaney, 2021; Schatsky et al., 2019).

A customer who searches online and gathers information from various sources about a desired product will leave a trail of information before ending up making the purchase or not. If this "trail" is captured and analysed effectively, businesses can gain insight into how customers search and arrive at the decision of buying or not. For example, Amazon collects information from online customer behavior

regardless of whether a purchase is made or not. This aggregate level information, which shows the roadmap of purchasing or non-purchasing decisions, is of significant importance in creating sales and marketing policies of businesses and allows the implementation of customized marketing strategies based on prediction (Bhimani & Willcocks, 2014).

Such data has not traditionally been at the heart of accounting activities. However, the fact that the management accounting practices are the primary source of internal data makes management accounting a well-suited candidate for incorporating external data related to non-financial transactions into decision-making processes.

For example, agricultural businesses can optimize their fertilizer use by using weather and geolocation data to estimate crop yields. Retailers can use customer data, economic data, data from suppliers and geolocation data for better demand forecasting and more effective inventory management. Satellite data can be used to estimate the emissions and output volumes of factories or to measure the environmental performance of companies within the scope of ESG ratings (Ranta et al., 2023). Possibilities for subsequent purchases can be determined based on data collected about consumers' behavior, and patterns or anomalies affecting sales can be revealed. In today's competitive environment, all kinds of data needs to be taken into account, and external data has the potential to shape cost management, pricing, performance management, cash management and net working capital management decisions, and help develop advanced analytics to optimize business processes (Nielsen, 2022; Bhimani & Willcocks, 2014).

3.1.2. Reduction in Costs

AI offers solutions that quickly analyse data, develop models, and automate business processes. Therefore, it has the potential to optimize business processes by performing tasks accurately and expeditiously that people perform manually. This provides businesses with cost savings in data creation and time savings in data analysis and verification (Odonkor et al., 2024; Värzaru, 2022; Korhonen et al., 2021; Gärtner and Hiebl, 2018).

3.2. Weaknesses

Weaknesses of using AI in management accounting are classified as problems in data quality, bias, users' lack of competence and design difficulty.

3.2.1. Problems in Data Quality

Wang and Strong (1996: 22) identified fifteen dimensions that define data quality, which are "accuracy, objectivity, believability, reputation, value-added, relevancy, timeliness, completeness, appropriate amount of data, interpretability, ease of understanding, representational consistency, concise representation, accessibility and access security". In many cases, these dimensions call for mutual trade-offs, and depending on the context, some dimensions may be more crucial than others (Neely & Cook, 2011; Rikhardsson & Yigitbasioglu, 2018). For example, the need for up-to-date data may require compromising the completeness or accuracy of the data. It is important to handle trade-offs in data quality dimensions within a cost-benefit relationship.

The quality of the data contained within the system and the quality of the system outputs are the two vital components of any accounting information system. In other words, data quality is of foremost importance for accounting information systems, and it has a huge impact on accounting practices through the design and implementation of systems and processes. In the context of AI and management accounting integration, the attributes of data quality can be considered from two different perspectives (Rikhardsson & Yigitbasioglu, 2018, p. 48). The first of these cover activities such as cost management and performance measurement and attaches more importance to dimensions such as completeness, accuracy, and believability of data. The second one includes the activities that give support to the strategic decision-making process, and from this perspective, the timeliness and relevancy of the data are the dimensions of primary importance.

In the world of "small data", accuracy was a very important feature. In analyses where general inferences were made by analysing only a limited amount of data, correct sample selection was a factor that affected the accuracy and validity of the analysis results (Mayer-Schönberger & Cukier, 2013). In today's "big data" world, real-time data covering the entire population is used. However, these data are based on very large data sets, often coming in various formats from a variety of sources, and it is practically and economically impossible to clean them and ensure their compliance with the usual data quality criteria. This situation is contrary to the nature of accounting practices, the essence of which is complete, accurate and reliable data. Working with raw data may lead to questioning the

accuracy and validity of the reports and tables prepared by management accountants in particular.

3.2.2. Bias

Because AI “learns” from existing datasets, it is important to understand whether the datasets used have inherent biases and errors. Many AI systems are based on rule-based algorithms, and these rules are derived from the knowledge and judgment of experts existing in the datasets. However, it is not possible to prove that these rules placed in the system are entirely correct. These rules, which may be biased or inaccurate due to experts' knowledge limitations, lack of experience, emotions, and the political and economic environment they are in, can be spread through the use of AI in analysis and decision-making processes (Zhang et al., 2023).

Therefore, it is vital that management accountants maintain their professional judgment when using AI in order to eliminate, or at least reduce, the impact of expert bias on decision making. Rikhardsson and Yigitbasioglu (2018, p. 46) expressed this situation with the following sentences: “If ‘correlation trumps causation’, crowd wisdom is made equal to expert opinion; and if suggestions and predictions of opaque algorithms have significant effect on behavior of managers and customer, then decision-making, like never before, will require sound human judgment.”

3.2.3. Users' Lack of Competence

Competency here refers to users being proficient in using AI systems to perform management accounting practices, having the necessary skills to conduct effective analysis and interpret results accurately. To achieve this, they need to understand basic database functions and SQL statements, but this is very difficult for accounting staff with little or no training and experience in these areas. Additionally, the use of AI in management accounting often involves many customized settings in financial indicators, models, rules, and presentations. These customized requirements often necessitate complex interactions and synergy between users and AI systems, making the use of AI even more difficult (Zhang et al., 2023; Moll & Yigitbasioglu, 2019).

In addition to knowledge and training, the psychological readiness level of employees is another factor that affects user competence. Employees who see AI as an obstacle or threat to their jobs and careers may develop a pessimistic perspective on changes in the accounting profession

and practices and may not be able to adapt to the new working environment. This situation may result in not achieving the desired benefit from the combination of management accounting and AI (Vărzaru, 2022).

3.2.4. Design Difficulty

Compared to ERP systems, management accounting-focused AI systems generally need to have more customized designs. Therefore, it is particularly important for system developers to completely apprehend management accounting functions and tasks, integration of management accounting and operational processes, identification, and preparation of needed data. For a fit-for-purpose design, system developers must have accounting background and knowledge, or must collaborate with accountants. Since the use of AI in the field of management accounting is very new, it may not be easy to find technical personnel with the necessary equipment (Zhang et al., 2023).

3.3. Opportunities

The opportunities offered by the use of AI in management accounting are examined in terms of smarter decisions and functional and professional transformation.

3.3.1. Smarter Decisions

AI technologies are designed to facilitate data collection, data analysis and information distribution processes and therefore support decision-making. Considering that the essence of management accounting is the activities that support the decision-making processes of businesses, there appears to be a clear connection between AI and management accounting. The importance of better data analysis and decision support for the value creation process of companies has been recognized by both company managers and researchers (Kiron et al., 2014; Elbashir et al., 2013). Therefore, real-time integration of operational, industrial, and social information into management accounting activities with AI technologies has the potential to develop the accuracy of accounting estimates and significantly improve decision-making processes (Odonkor et al., 2024; Rikhardsson & Yigitbasioglu, 2018).

There are many areas in management accounting that require forecasting. For example, standard costs are determined by estimates. When preparing operating budgets, much of the cost data must be estimated. In the activity-based costing system,

employees are expected to distribute the total time they work among the activities they perform. In the time-driven activity-based costing system, activity durations are estimated. Whether intentional or not, forecast errors negatively affect the quality of financial information. Improvement in the quality and reliability of accounting estimates will significantly increase the accuracy and relevance of financial information.

Machine learning algorithms are considered the most suitable tool for problems where the set of variables, the interactions between these variables, and their effect on the output results are not theoretically clear (Ranta et al., 2023). In such cases, there does not need to be a monotonic relationship between the dependent and independent variables and the interactions between the variables are not known in advance (Bertomeu et al., 2021). Predictive modeling techniques are a particularly useful research approach in situations where there is no strong theoretical or empirical evidence indicating the impact of one variable on another. In machine learning, data guides the determination of variables and the relationships between these variables, and complex patterns can be created with algorithms. Therefore, AI can use large amounts of data systematically and logically to reveal the hidden potential contained in this data. Even if people have forward-looking information which AI does not have, and so cannot use, it is claimed that the models created by AI are superior to the models that humans can create (Ranta et al., 2023; Ding et al., 2020). In this context, AI technologies can provide data-centered decision support to management accountants on issues such as planning, cost management, and performance measurement.

Machine learning and business intelligence applications support various management accounting tasks such as product profitability analyses, cost estimations, financial impact of production changes, evaluation of customer segment profitability, inventory management, and can be used in various types of routine and non-routine decisions such as new product development, pricing, and determining the optimal product mix (Geddes, 2020; Kowalczyk & Buxmann, 2015; Rikhardsson & Yigitbasioglu, 2018; Nielsen, 2022; Granlund & Teittinen, 2017). These decisions are closely related to the raw material supply chains, production capacity, characteristics of the production processes, cost structures of the products, competitors' strategies, market conditions and customers' demands. Simulations

created with AI can show the effects of different decision options on profitability.

R&D, engineering, production, and cost information integrated with data analytics tools can be transformed into workflow improvements and effective cost reduction strategies with machine learning algorithms. These strategies also support systems such as activity-based management and time-driven activity-based management systems, and lean production philosophy (Schneider et al., 2015; Granlund & Teittinen, 2017).

Machine learning can also be used in the performance evaluation process. With AI, new criteria can be defined for balanced scorecard dimensions and performance data regarding these criteria can be used in strategy maps. For example, web use at work can be associated with the learning and growth dimension, internal e-mails can be related with the internal business process dimension, and voice recordings obtained from customer service calls can be associated with the customer dimension. Data on the time employees spend on the phone can be used for productivity measurements. While more phone calls may indicate higher productivity in sales, the opposite may be true in manufacturing. By tracking the web activities of the employees, activity schedules containing data on the time spent on the internet can be created. Companies can also monitor what employees do outside the company with company resources such as vehicles and cell phones. This information provided by big data can be included in companies' control mechanisms, strategy maps, performance measurements and budgets with AI solutions (Warren et al., 2015). In his study, Jang (2019) discussed the issue of determining the optimal budget allocation for an R&D program and created a decision support framework with machine learning algorithms to determine the optimal budget amount for each project within the program in order to maximize the total of expected R&D outputs, and revealed that 13.6% better R&D output can be achieved with a budget created with AI.

In summary, unlike traditional accounting methods that involve a time delay between data entry and report generation, AI systems provide instant analysis, enabling timely and smarter decision-making. The benefit of this feature is great in today's business environments, where making the right decisions quickly is vital. Additionally, unlike traditional accounting methods, whose scope is often limited to historical data analysis, AI also

improves the scope and depth of financial analysis by predicting future trends and patterns (Odonkor et al., 2024).

3.3.2. Functional and Professional Transformation

Although ERP systems have increased the efficiency of accounting data collection and reporting activities by accelerating manual processes, they did not lead to direct or significant changes in management accounting practices (Rom & Rohde, 2007; Granlund & Malmi, 2002). AI technologies have the potential to fundamentally change management accounting processes. With AI technologies, management accounting tasks are now performed by analysing and processing financial and non-financial data to ensure the realization of corporate value creation goals (Li et al., 2020). In this way, AI makes the contribution of management accounting to the value creation process more visible.

In businesses, management accounting functions and management accountants are becoming increasingly important. Management accountants have appropriate skills for data analytics tasks as they are generally detail-oriented, trained to document their work, experienced in making judgments about different decision options, familiar with many aspects of business processes including information technology, and perceived as trusted advisors (Schneider et al., 2015; Bose et al., 2023). Using AI as an effective tool to support business processes, effectively integrating business and financial information, and providing information consultancy services to different departments transforms the role of management accountants from “executer” to “manager” making them one of the important actors in the decision-making process (Li et al., 2020). These developments require management accountants to work in close cooperation with other departments of the business.

Another issue is the transition from “data ownership” to “data access” and its impact on management accounting. In the age of AI, it is not important how much data businesses have, but how much data they can access. It is inevitable that this transformation will change the roles of management accountants, who are also called as “data managers” or “data curators”, in the organization they work in (Nielsen, 2022; Rikhardsson & Yigitbasioglu, 2018). Employees across different business functions want to have accounting data and associate them with other data.

Management accountants have a great opportunity to take on such responsibilities, providing access to data and assisting with data combination, as a large part of their job is data related.

3.4. Threats

The threats posed by the use of AI in management accounting are classified as loss of control, data security and confidentiality problems, loss of status and decrease in motivation.

3.4.1. Loss of Control

The use of technology may not always increase performance. The reason for this is that decision makers often have cognitive biases regarding decision support systems. Decision makers are inclined to adopt a “computer is right” attitude when using technology. With AI performing accounting activities that were once performed by humans, it may create a false sense of security that human errors are no longer an issue and that everything is under control. Over-reliance on AI results may lead to a confined focus on events and patterns identified by AI, while ignoring undetected factors, creating a kind of “information cocoon” (Zhang et al., 2023). Since many expert rules from previous analyses and cases are predetermined in AI systems, occasional events and changing environments will not be taken into account by AI. Therefore, relying solely on AI carries the risk of causing wrong decisions to be made much faster (Korhonen et al., 2021; Zhang et al., 2023; Schneider et al., 2015).

Without a full understanding of the content of the tasks delegated to AI and without accepting that human intelligence and AI are completely different from each other, premature replacement of human labor by automation could result in disaster (Vărzaru, 2022; Korhonen et al., 2021). The function of the AI systems should be limited to providing early warning and support for decision making, rather than being a decision maker. Human intelligence and professional judgment will always remain necessary in the decision-making process.

3.4.2. Data Security and Confidentiality Problems

As mentioned earlier, AI, unlike ERP systems, integrates not only data from a number of financial and operational systems but also various external data. This data explosion creates managerial dilemmas. AI technologies that promote data volume, speed, and availability, providing the capacity to combine digital forms and supporting

analytics by making data easier to store and cheaper to process, also run the risk of introducing the data security, privacy and abuse problems they were designed in part to solve. (Bhimani & Willcocks, 2014).

Using AI to perform management accounting tasks necessitates the use of large amounts of financial and operational data, which often reveals information about strategies, projections, operations, key performance indicators, and clients which must be kept confidential and may even contain trade secrets. Therefore, it is important how AI extracts and stores data and whether a third party can access them (Appelbaum et al., 2017; Zhang et al., 2023). Whether data is stored in the cloud or on software developers' servers, how software developers ensure that data is not leaked when they log in to the system remotely and download financial and commercial data, and how to ensure the security of existing data when the contract with a service provider is terminated are issues that need to be carefully considered (Gärtner & Hiebl, 2018).

AI systems also integrates external data such as industry information, social media data on other companies and legal events with financial data to develop comprehensive models for tasks such as risk control and budget forecasting. However, this external data usually comes from third-party organizations or individual web browsers. This may raise issues of data reliability, copyright issues, and bias (Zhang et al., 2023).

3.4.3. Loss of Status

Frey and Osborne (2018, p. 265) stated that 47% of total employment could be replaced by AI in the near future and identified accounting as one of the professions in the high-risk group. The prevailing view is that AI will be a destructive force in accounting in general. AI will eliminate the data recording task of management accounting, make some management accounting techniques obsolete, change the role of accounting in decision-making processes, and require significant changes in the skill sets of management accountants (Rikhardsson & Yigitbasioglu, 2018). While AI reduces the workload in data collection, creating financial indicators and analysis, it creates new business requirements and requires new competencies. The scope of management accounting has expanded, and accountants today are expected to not only master traditional management accounting knowledge but also to have a comprehensive understanding of

various business processes and technologies (Li et al., 2020; Zhang et al., 2023). This situation can be perceived as a threat or an opportunity.

Another problem that, by reducing ideas to digital format, AI may pose the risk of eliminating the human aspect of managerial decisions. Human intelligence and machine intelligence are hugely different from each other, and this distinction requires a conscious and rational distribution of tasks between humans and AI (Korhonen et al., 2021, Moll & Yigitbasioglu, 2019). Otherwise, AI could lead to skill mismatch by turning management accountants into "automation followers".

3.4.4. Decrease in Motivation

With AI, businesses can monitor activity logs on employees' computers, control web usage to identify unproductive behavior, and evaluate employee performance through behaviors captured through various sensors. However, it is important to determine to what extent such new data types and performance measures provide better performance, and beyond what point they are likely to be disruptive and negatively affect motivation. The fine line between increasing performance and efficiency and getting negative results parallels the calls to investigate how today's digital technologies, where everything can be monitored at all times and all kinds of data become available, can change the practices of democracy, invade privacy and create new forms of social structure (Rikhardsson & Yigitbasioglu, 2018).

Overmonitoring can stifle employees' creativity and motivation. If employers constantly micromanage their employees, they may hesitate to come up with creative ideas or be afraid to take initiative (Warren et al., 2015). Especially if measurement brings with it judgment, this situation can become even more severe and ultimately cause considerable damage to the business. Managers must carefully examine the information obtained and show utmost sensitivity to ensure that it is never consumed too quickly (Quattrone, 2016).

4 | CONCLUSION

The added value of AI is based on the increase in data-driven decision-making and hence the improvement of decision quality and organizational performance. The adoption of AI presents a unique opportunity for management accountants who are already experts at analysing and making sense of data. Armed with AI, management accountants can leverage sophisticated analysis to improve

organizational performance measurement, create effective management control systems, and improve the quality of management accounting. It is expected that with AI, many management accounting activities will become hybrid and be performed based on information provided by AI solutions, leading to an expansion of the competency and skill mix of management accountants. Due to the digitalization and complexity of the relationship between the business and its environment, management accounting has become an interdisciplinary field.

It will be a big mistake to expect AI to provide comprehensive information and decide what should be done in the future. AI is a technology that facilitates the decision-making process by providing a template of information. Therefore, it is more appropriate to define AI as a tool that management accountants can use to perform analyses. At the current stage of its development, human intervention and professional judgment are still required.

This study presents a SWOT analysis based on literature review on the use of AI in management accounting practices. AI applications in management accounting are still in their infancy. For this reason, studies and research on the subject are limited and most of them are based on assumptions. It is still unclear whether AI is suitable for management accounting processes and how it will affect management accounting practices. For example, whether management accounting will expand its data scope to include external data rather than continue to rely primarily on internal data, or whether it will apply complicated statistical analysis methods rather than continue to use traditional management accounting techniques, will be answered over time. The impact of using external data on revenue and cost estimates, the budgeting process, and forecast quality is also unknown. Therefore, as the use of AI becomes widespread, it is inevitable that changes will occur in the framework set forth in this study.

REFERENCES

Aaser, M. & McElhaney, D. (2021). Harnessing the power of external data. McKinsey Technology.

Appelbaum, D., Kogan, A., Vasarhelyi, M., & Yan, Z. (2017). Impact of business analytics and enterprise systems on managerial accounting. *International Journal of Accounting Information Systems*, 25: 29–44.

Bertomeu, J., Cheynel, E., Floyd, E., & Pan, W. (2021). Using machine learning to detect misstatements. *Review of Accounting Studies*, 26(2): 468–519.

Bhimani, A. & Willcocks, L. (2014). Digitisation, “Bigdata” and the transformation of accounting information. *Accounting and Business Research*, 44(4): 469–490.

Bose, S., Dey, S. K., & Bhattacharjee, S. (2023). Big data, data analytics and artificial intelligence in accounting: An overview. In S. Akter & S. F. Wamba (Eds.), *Handbook of big data methods*, pp. 32–51, Edward Elgar Publishing.

Caglio, A. (2003). Enterprise resource planning systems and accountants: Towards hybridization? *European Accounting Review*, 12: 123–153.

Ding, K., Lev, B., Peng, X., Sun, T., & Vasarhelyi, M. A. (2020). Machine learning improves accounting estimates: Evidence from insurance payments. *Review of Accounting Studies*, 25(3): 1098–1134.

Elbashir, M.Z., Collier, P.A., Sutton, S.G., Davern, M.J. & Leech, S.A. (2013). Enhancing the business value of business intelligence: The role of shared knowledge and assimilation. *Journal of Information Systems*, 27(2): 87–105.

Frey, C. B. & Osborne, M. A. (2017). The future of employment: How susceptible are jobs to computerisation? *Technological Forecasting and Social Change*, 114: 254–280.

Gärtner, B. & Hiebl, M.R. (2018). Issues with big data. In Quinn, M. & Strauss, E. (Eds), *The Routledge companion to accounting information systems*, pp. 161–172, Routledge.

Geddes, B. H. (2020). Emerging technologies in management accounting. *Journal of Economics and Business*, 3(1): 152–159.

Granlund, M. & Malmi, T. (2002). Moderate impact of ERPS on management accounting: A lag or permanent outcome? *Management Accounting Research*, 13: 299–321.

Granlund, M. & Teittinen, H. (2017). Accounting information systems and decision-making. In Quinn, M. & Strauss, E. (Eds.), *The Routledge companion to accounting information systems*, pp. 81–93, Routledge.

Jang, H. (2019). A decision support framework for robust R&D budget allocation using machine learning and optimization. *Decision Support Systems*, 121: 1–12.

- Johnson, E., Petersen, M., Sloan, J., & Valencia, A. (2021). The interest, knowledge, and usage of artificial intelligence in accounting: Evidence from accounting professionals. *Accounting & Taxation*, 13(1): 45–58.
- Kiron, D., Kirk, P., Ferguson, R., (2014). The Analytics Mandate. <http://sloanreview.mit.edu/projects/analytics-mandate/> (Accessed on Dec. 10, 2023).
- Korhonen, T., Selos, E., Laine, T., & Suomala, P. (2021). Exploring the programmability of management accounting work for increasing automation: an interventionist case study. *Accounting, Auditing and Accountability Journal*, 34(2): 253–280.
- Kowalczyk, M. & Buxmann, P. (2015). An ambidextrous perspective on business intelligence and analytics support in decision processes: Insights from a multiple case study. *Decision Support Systems*, 80: 1–13.
- Küçüker, M. (2023). Muhasebede yapay zekâ uygulamaları: ChatGPT'nin muhasebe sınavı. *Firat Üniversitesi Sosyal Bilimler Dergisi*, 33(2): 875–888.
- Lawson, R. What do management accountants do? IMA. <https://business.okstate.edu/site-files/archive/docs/accounting/what-do-management-accountants-do.pdf> (Accessed on Dec. 3, 2023).
- LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. *Nature*, 521: 436–444.
- Li, C., Haohao, S., & Ming, F. (2020). Research on the impact of artificial intelligence technology on accounting. *Journal of Physics: Conference Series*, 1486, 032042.
- Mayer-Schönberger, V. & Cukier, K. (2013). *Big data: A revolution that will transform how we live, work and think*. John Murray, London.
- Moll, J. & Yigitbasioglu, O. (2019). The role of internet-related technologies in shaping the work of accountants: New directions for accounting research. *The British Accounting Review*, 51(6), 100833.
- Nielsen, S. (2022). Management accounting and the concepts of exploratory data analysis and unsupervised machine learning: A literature study and future directions. *Journal of Accounting & Organizational Change*, 18(5): 811–853.
- Norvig, P. & Russell, S. J. (2009). *Artificial intelligence: A modern approach*. Prentice Hall.
- Odonkor, B., Kaggwa, S., Uwaoma, P. U., Hassan, A. O., & Farayola, O. A. (2024). The impact of AI on accounting practices: A review: Exploring how artificial intelligence is transforming traditional accounting methods and financial reporting. *World Journal of Advanced Research and Reviews*, 21(1): 172–188.
- Quattrone, P. (2016). Management accounting goes digital: Will the move make it wiser? *Management Accounting Research*, 31: 118–122.
- Ranta, M., Ylinen, M., & Järvenpää, M. (2023). Machine learning in management accounting research: Literature review and pathways for the future. *European Accounting Review*, 32(3): 607–636.
- Reinsel D., Gantz J., & Rydning J. (2018). The digitization of the world - from edge to core. IDC White Paper. <https://www.seagate.com/files/www-content/our-story/trends/files/idc-seagate-dataage-whitepaper.pdf> (Accessed on Nov. 12, 2023).
- Rikhardsson, P. & Yigitbasioglu, Q. (2018). Business intelligence & analytics in management accounting research: Status and future focus. *International Journal of Accounting Information Systems*, 29: 37–58.
- Rom, A. & Rohde, C. (2007). Management accounting and integrated information systems: A literature review. *International Journal of Accounting Information Systems*, 8: 40–68.
- Schatsky, D., Camhi, J., & Muraskin, C. (2019). Data ecosystems: How third-party information can enhance analytics. Deloitte Insights. https://www2.deloitte.com/content/dam/insights/us/articles/4603_Data-ecosystems/DI_Data-ecosystems.pdf (Accessed on Nov. 19, 2023).
- Schneider, G. P., Dai, J., Janvrin, D. J., Ajayi, K., & Raschke, R. L. (2015). Infer, predict, and assure: Accounting opportunities in data analytics. *Accounting Horizons*, 29(3): 719–742.
- Värzaru, A.A. (2022). Assessing artificial intelligence technology acceptance in managerial accounting. *Electronics*, 11(14), 2256.
- Wang, R. Y. & Strong, D. M. (1996). Beyond accuracy: What data quality means to data consumers. *Journal of Management Information Systems* 12(4): 5–33.

Warren, J., Donald, J., Moffitt, K.C., & Byrnes, P. (2015). How big data will change accounting. *Accounting Horizons*, 29(2): 397-407.

Zhang, C., Zhu, W., Dai, J., Wu, Y., & Chen, X. (2023). Ethical impact of artificial intelligence in managerial accounting. *International Journal of Accounting Information Systems* 49, 100619.

Zhang, X. (2021). Application of data mining and machine learning in management accounting information system. *Journal of Applied Science and Engineering*, 24(5): 813-820.