SKILL-SET REQUIREMENTS OF MANAGEMENT ACCOUNTANTS IN THE CONTEMPORARY OPERATING ENVIRONMENT

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ABSTRACT

This paper examined skill-sets required of management accountants in today's disruptive environment where digitalization is the hallmark of organizational operations. Extant literature showed that digitalization has led to expansion of management accounting practice, with fluid boundaries for data analytic specialists without accounting background. With continuous improvements and expansion in digital technology, especially in the realm of artificial intelligence, reliance on Big Data and Analytical tools, and e-based operations, management accountants are required to take up additional skill-set to remain relevant. The implication of digitalization for management accountants entails that financial analysts' ability to process internal and external data and segregate essential and reliable data from mere noise efficiently, constitute key new skills. This requires a shift in management accountant's role towards that of data scientist, with strong systematic and mathematical-statistical competencies. Also, ability to collaborate and navigate across functional lines has become critical in shoring up continuous relevance. Therefore, skill-set upgrade and versatility are the way to go for management accountants to hedge against obsolescence.
Keywords: Big data, management accountant, skill-set, digitalization

INTRODUCTION

Corporate entities in today's operational environment that is in a constant flux requires relevant up-to-date information to facilitate informed decision-making. The changing dynamics of the environment, which are shaped by technology happenstance undermines the sufficiency of routine accounting information and skill-sets. While, often not a commonplace discriminated activity in routine business settings, management accounting (MA) is increasingly gaining steam propelled by tech/business model changes.

MA entails taking part in management decision-making processes, establishing new planning and performance management systems, and providing conceptual and technical know-how in financial reporting and control to remain supportive of management in the organisation's strategy formulation and implementation (Gebhardt et al., 2015). Decision-making is increasingly becoming complex, and requiring apt decision support frameworks that are robust, yet flexible in delivering optimal outcomes. Clearly, merely providing information is has become insufficient. Instead, strategic cooperation is essential to management accountants' survival (Weber & Schäffer, 2016).

Industry 4.0 has reinforced the importance of Big Data and digitalisation in transforming business processes and creating value in the information age (Rafi et al., 2019). There is a growing abundance of data in the MA department due to the rapid development of information systems (Rafi et al., 2019). Due to widespread use of digital technologies, a wider range of data about current processes is now readily available, elevating information to the status of a true factor of production. Furthermore, digital economy financial control and MA operations are adopting new dimensions with the potential for major modifications from cost-based to value-based model changes (Bhimani & Bromwich, 2009). Digital and industrial convergence have been addressed at the technology level, but the

implications for management accountants and the processes have received less attention in developing countries.

Because MA processes are analyzed in terms of their suitability for digital instruments, it challenges MA's existing paradigm (Keimer et al., 2017; Langmann, 2019). Some of the most important procedures, such as planning, forecasting, reporting and consulting, have been adversely affected (Keimer et al., 2017). As a rule, routine and transactional processes can be readily automated (Keimer et al., 2017). Digitalisation appears to significantly influence resource-intensive procedures such as reporting and budgeting (Langmann, 2019). In other words, digital transformation and responsibilities assumed by management accountants will impact organisations. It is vital to continue the discourse about how management accountants will need to adapt to the digital environment and how digitalisation will affect their abilities.

Interestingly, much of management accountant's role has shifted toward supporting managers' decision-making, anticipating information needs, taking up internal business consultants, and getting involved in multi-functional teams (Janet, 1998). Managerial accountants now deal with more data, which necessitates the use of Big Data specialists with expertise in MA. There is a substantial influence on MA practise and society due to the rise of Big Data and rising trend toward digitalisation. The importance of data and information to MA professionals and the competence and skills required to meet workplace expectations also holds implications for MA and employability of management accountants.

To avoid becoming obsolete in the face of growing use of robotics to perform white-collar jobs, such as accounting and banking, the growing trend toward digitization and digitalisation has created a need for management accountants to strengthen and advance their roles as management-supportive experts (Martin, 2019). The changing roles of MA is also connected to product development issue, and as such, digitalisation, sustainability, new business model, socio-cultural dynamism, and global competition pass as major determinants of the direction in the evolving roles of MA (Varaniute et al., 2022).

Ogoun (2020) opined that technological advances in AI in real terms have come at such unimagined magnitude and disruptions to so many aspects of traditional socio-economic interactions, while at the same time progressively benefiting several other domains of social interfaces. The negatives are borne severely by aspects of societal dealings that were once thought of as sacrosanct and sacred. The aspects of social life where the negatives weigh heavily fall within traditional areas of life that hindsight of the impacts of future human developmental aspirations were never projected and hedging provided for. Hence, the interrogation of skill-sets requirements for management accountants in the emerging digitalized practice space.

LITERATURE REVIEW

Developmental trajectory of Management Accounting
Prior to this digital era, MA has been relied upon to determine cost and profitability; and is responsible for analysis and financial control (Kagermann et al., 2013). MA is charged with rendering support in the design of organisations' information system, data collection, maintaining accounting records and preparation of financial statements, and support in budget preparation. Also, insight into the status of MA necessitate a retrospective view of the evolution of MA.

Changes in MA had been of keen interest for most researchers in the field of accounting. MA has witnessed a promising period of various searches and efforts to trace its identity in most developed countries (Corina et al., 2014). The International Federation of Accountants (IFAC) effort to unfold the various stages of evolution had been a source of insight into the status of MA. Corina et al. (2014) identified four stages in the evolution of MA. Stage 1- (prior to 1950) covers the era of cost determination and financial control. Stage 2- (from 1965) focuses on providing information for planning and control and less on strategic consideration. Stage 3- (from 1985), focused on direction

on cost control for waste reduction; while stage 4- (from 1995) to date is more driven by technologies and digitalisation to create value through efficient resource utilisation.

The first two stages reveal MA's existing status before the gradual digitalisation in most developed countries. Interestingly, the mode of operation in MA in the first two stages have not gone extinct. Instead, they are redirected and integrated with the last two stages, which is much more useful in the value creation processes for customers, shareholders and the organisation. According to Corina et al. (2014), the information provision by MA in stage two is vital to resource management, waste reduction, and value creation, making MA an integral part of management processes. This has also blurred the distinction between staff and line management as MA has been seen to take a strong position as the single source of truth for being a gatekeeper of the firm's information (Rafi et al., 2019).

Moreso, the status of MA has evolved into supporting management in strategic, tactical and operational level decision-making by providing relevant information and deploying relevant resources for value creation. In the face of the competitiveness of companies, the decision support provided by management accountants also help in product development, which further generates more revenue for the firm. MA is necessary to strike a healthy balance between income and expenses generated by product development in order to ensure products' financial viability (Varaniute et al., 2022).

Current State of Management Accounting

The key premise of this conceptual piece concerning the present condition of MA is neither the absence of particular regulatory requirements nor consistence with MA national/international professional organisation recommendations (Dumitru & Calu, 2008). Rather, our focus is on the job profile and evolving capability requirements of management accountants to enable them remain active participants in decision-making processes. Given how management accountants' profiles are evolving, the issue of which abilities and competencies management accountants must possess today and, in the future, and how the advent of digitalisation in MA affects their professional need emerges.

MA is primarily concerned with accomplishing duties and creating reports that inform internal users and corporate leadership about financial choices affecting the firm's general operations. Due to the reporting obligations of management accountants, entrant into the MA profession must be equipped with risk management, budgeting, strategic planning, and financial data analysis skills. They must be familiar with generally accepted accounting principles (GAAP), possess great communication skills, and be proactive. These requirements may vary, depending on size, overall income, compliance, and reporting needs of organisations.

Similarly, management accountants now appear to serve as business partners in today's more automated workplace (Heinzelmann, 2019). Not only do they need to be familiar with ERP softwares in use at their company, they must also be versed in best practices for incorporating information generated by ERP into daily operations and strategic planning. There has to be a profound familiarity with the big data ecosystem, AI, the Internet of Things, and other IT interfaces. Therefore, IT skills, software skills, and big-data analytical abilities are positive when compared to the reducing demand of record keeping, report preparation and manual data analysis (Alam & Hossain, 2021).

Also, there is a growing need for management accountants to be possess expertise in statistics and information technology and social and communication abilities without overlooking the need for a thorough grasp of their industry (Rafi et al., 2019). Seufert and Oehler (2016) detail the statistical technique abilities (e.g. regression, time series, and clustering) that MA will need to develop to separate themselves from Data Scientist. Additionally, as Big Data's relevance increases and as analyst and information expert grows, pliant management accountants will engage more in data science and data mining.

However, neither theory nor practice has paid much attention to the degree to which the job profiles and competencies necessary for digitalisation match the subject of MA (Rafi et al., 2019). Similarly,

management accountants' skill development through industry 4.0 has received scant attention in MA literature. Interestingly, Rafi et al. (2019) reveals that with digitalisation, MA will become decentralised. With the technological progress with new tools, Chief Financial Officers (CFOs) and Chief Information Officers (CIOs) will collaborate even more closely to use Big Data.

Besides, the present state of MA is context-dependent, contingent upon the climate in which it is practiced and the firm's reporting habits. It is a function of organisational design and structure and circumstances faced by the organisation. In tune with this view is the contingency theory, which maintains that no perfect organisational system works in every situation. Instead, a company's structure is a result of how its leaders anticipate and react to unforeseen circumstances (Ghandour, 2021).

Advanced countries are rapidly responding to environmental change and organisational contingencies by automating their MA operations. Management accountants are evolving into strategic decision-makers, whilst most developing countries continue to operate in analogue environments, with management accountants in charge of cost determination and financial control. To keep pace with global competition, emerging economies need a quick switch to digital operations. Non-digitalised operations may have sustainability challenges. However, stakeholders are putting increasing pressure on businesses to account for environmental effect of their actions, which is reflected in changes in MA concerning sustainability and circularity issues. Also, digitalisation, sustainability, and circularity play a crucial part in MA (Varaniute et al., 2022).

MA has also changed from the traditional paradigm of prioritising budgeting above other aspects like incentives, cost estimation, and financial control (Kagermann et al., 2013). In addition, the scope, practice and application of MA has extended to strategic, performance, and risk management (Zabiullah et al., 2017; Varaniute et al., 2022). Moreover, Zabiullah et al. (2017) recognized seven important trends in MA: Expansion from product to channel and customer profitability analysis, globalisation of MA, Cloud computing, expanding importance of MA in enterprise performance management (EPM), transformation to predictive accounting, embedded business analytics in EPM approaches, coexisting and enhanced MA approaches, managing information technology and shared services as a company, and the need for higher skills and proficiency with behavioural cost management.

Revolutionizing Management Accounting Systems

The history of MA has been marked by extraordinary attention that has been deliberately instilled or tied to changes in organisational strategy. The significant changes seen in MA are environmentally driven and should not be interpreted as random (Waweru, 2010; Ghandour, 2021). From the established paradigm or outmoded standard of operation, the amount of change witnessed in MA is primarily motivated by demands of rising hostile competition, new technology, perceived tyranny of financial accounting, and growing importance of MA (Guinea, 2016). As previously stated, the development of MA is attributed to its responsiveness to organisational and product changes.

According to Dahal (2019), the additional direction of MA is to assist management in making competitive decisions by collecting, processing, and conveying information that aid management in planning, managing, and assessing business processes and enterprise strategies. Nonetheless, MA has shifted from a focus on backward-looking management tasks towards future-oriented information systems that help in strategic planning, control, and decision-making. Historically, MA have used historical data to concentrate on yearly controls in safe and proven competitive operating contexts to assess overall performance and manipulate responsibility within the organisation (Ikaheimo & Taipaleenmäki, 2010; Taipaleenmaki & Ikaheimo, 2013).

However, contemporary business challenges, such as global competition, commercial enterprise networks, and rising relevance of securities markets as a source of financial resources, have dominated present company activity. As a result, new MA information requirements have evolved, including an increased need for forward-looking data to help with strategic planning and decision-

making (Taipaleenmaki & Ikaheimo, 2013; Goretzki et al., 2013). With the introduction of Big Data, data analytics, and other digitalisation phenomena, MA information requirements will be comprehensive and timely to help in value generation and decision making.

Digitalisation and its Dimensions
It is admitted that digitalisation has no all-encompassing universal definition. However, it originally means converting from an analogue to a digital process or transforming analogue data into digital information (Nobach, 2019). With the degree of automation of processes in most advanced nations, it is clear that digitalisation has gained much relevance both in production and non-production processes. Interestingly, the past few years have witnessed the emergence of several technologies (Gadatsch et al., 2017; Internationaler Controller Verein, [ICV], 2014; Lawson, 2018), having both digital and information dimensions. Some of these digitalised structures relevant to MA are explained in this section.

The Big Data movement, which began about 2010, is one of several contemporary digital developments in data analysis (ICV, 2014). According to Langmann (2019), big data refers to a massive amount of data that is rapidly created, altered, and may take on various forms. According to Davenport (2014), Big Data is the process of developing vocabularies for evaluating and analysing data to assist management decision-making. These descriptions shows that Big Data exhibit 3Vs (volume, variety, and velocity) characteristics described by Gartner Research and Advisory (Gadatsch et al., 2017). Thus, Sicular (2013) defines Big Data as high-volume, high-velocity, and diverse information assets that need cost-effective, creative methods of information processing for improved insight and decision-making. In an extended explanation that considers accuracy of information and economic value it provides, the 3Vs were expanded to 5, with the addition of Veracity and Value; based on the argument that Big data should provide accurate information (veracity) in order to achieve economic advantages (value) (Heimel & Müller, 2019; Lippold, 2017).

Additionally, the amount of data generated is increasing at a consistent rate. According to ICV (2014), the amount of global data will expand fiftyfold due to increased use of sensor technologies in manufacturing and logistics and mobile internet usage. As a result, management accountants have a responsibility to handle the deluge of information caused by Big Data, as they are charged with the obligation of providing information for decision-making. The promise of Big Data cannot be overstated since it generates additional value across the value chain.

Business Analytics (BA) is another layer of digitalisation that emerged five years before Big Data and has grown in popularity (ICV, 2014). BA is defined as the use of diverse approaches, including statistical analysis and algorithms, to generate insight from data to solve issues and aid decision-making (Langmann, 2019; Chamoni & Gluchowski, 2017). BA is characterised in phases, each of which allows enterprises to create value, although on a different time horizon. We have descriptive analytics, which is focused on what occurred, and diagnostic analytics, which is focused on why it occurred. Cost accounting may make use of descriptive and diagnostic analytics. In the future, we will have real-time analytics that will show us what is now occurring (Lanquillon & Mallow, 2015).

This may be facilitated by the use of Business Intelligence (BI). Predictive analytics asks, "What is likely to happen?" from a future forecast. On the other hand, Prescriptive analytics recognises what should be done (Lawson, 2019), assisting MA in its planning and decision-making roles. This demonstrates the evolution of MA's function from antiquated MA systems focused on financial decision-making, budget control, and profitability analysis to performance management and company profitability. Interestingly, EPM, being an expanding role of management accounting, is embedded in BA (Varaniute et al., 2022).

Additionally, BI is one of the characteristics of digitalisation that is more established, and dates back to 1989. (ICV, 2014). BI may be defined as a concept and management tool that enables a business to manage and improve business data in order to make more informed decisions (Ghoshal & Kim, 1986). According to Kemper et al. (2010), BI strives to facilitate decision-making via an all-encompassing

integrated strategy based on IT technologies that are driven by company-specific strategic requirements. A BI solution is a collection of the tools required to gather and convert data to acquire essential information for analysis. According to (ICV, 2014), BI encompasses a variety of technological techniques, making Big Data and other tools a subset of the wider term.

According to a 2006 Gartner research, BI is the most debated topic in IT because it ensures that systems focus on initiatives that enable users to positively impact business financial success (Baier, 2019). BI enables the firm to better manage the flow of business information and resources both inside and beyond the enterprise. According to Tamandeh (2016), BI in the digital era enables organisations to detect and convert huge amounts of data into pure intelligent knowledge that managers can use for strategic purposes. From a technological standpoint, BI may be compared to competitive intelligence since organisations primarily use it to achieve a competitive advantage.

Other existing technologies, such as robotic process automation (RPA), machine learning, and artificial intelligence (AI), are accorded the necessary acknowledgement. RPA is a term that refers to software robots capable of simulating human interaction across disparate systems by automating repetitive, structured, and rule-based operations (Langmann, 2019). Machine learning is a term that refers to self-learning algorithms that make predictions about unknown data by inferring meaning from the data and deducing correlations (Langmann, 2019). RPA adheres to programmed rules since it is not considered intelligent. Yet, when combined with machine learning, it becomes more capable of learning to make connections without the use of structured data (Langmann, 2019; Lämmel & Cleve, 2012). AI has a position in information science to simulate how people think, behave, and solve issues via the use of computers to discover new or more efficient ways to do jobs (Lämmel & Cleve, 2012).

Digitalisation in Management Accounting: Implications for Management Accountants
There is significant scepticism across organisations and organisational platforms about the emergence of Big Data and its influence on MA information, controls, and decision-making, particularly questioning how Big Data is altering managers' reliance on more conventional information (Drew, 2018). Specifically, the emergence of Big Data and other novel forms of analysis associated with the proliferation of digital technology enables organisational players to govern both organised and unstructured data.

However, actions taken in response to such fresh information demonstrate a break with the historical dependence on information systems output, reflecting earlier corporate plans and operations and associated decision-making that led accountants' work in the past. There is a growing realization that business strategy, organisational structures, and information system structures defy conventional linkages that were previously believed to connect them, as a greater emphasis is placed on Big Data-based analyses and insights (Bhimani 2015; Krahel & Titera, 2015).

The issues inherent with Big Data, particularly the diversity of data from several sources (variety) of possibly uncertain economic quality (value), have important consequences for management accountants. As a result, financial analysts' capacity to analyse internal and external data quickly and to separate significant and trustworthy data from noise will comprise a critical set of new abilities. Consequently, management accountants' function will be transformed into that of data scientists with strong systematic and mathematical-statistical abilities (Karenfort, 2017).

Collaboration across departments becomes important to fully exploit the promises of digitisation. Furthermore, the IT department is expected to serve as an enabler and provide support for management accountants. From a strategic standpoint, the emergence of a hybrid accountant, who possesses both managerial and accounting skills, is expected to foster close collaboration with process managers to demonstrate greater willingness to reshape MA design and processes in response to the digital economy and globalisation issues (Bhimani & Bromwich, 2009; Bhimani & Bromwich, 2009; Burns et al., 2003).

Skill-set Requirements in an Increasingly Digitalised Environment
The argument that management accountants increasingly collaborate with managers on strategic thinking and decision-making has increased MA challenges in digitally transformed organisations. Accounting information use and relevance have been questioned in the face of a digital economy. The massive capital market values of digital enterprises such as Facebook, Airbnb, Twitter, and Uber have sparked a significant debate over the use of accounting information (Govindarajan et al., 2018a).

Ogoun (2020) asserts that top corporations with sterling market value are app-driven and do not have any of the conventional types of major physical asset holdings. The illustrative position of Govindarajan et al. (2018a) shows that digital firms are more valuable than non-digital enterprises. Walmart, for example, has non-current assets of US $ 160 billion and a market capitalisation of US $ 300 billion, compared to Facebook, which has non-current assets at US $ 9 billion and a market capitalisation of US $ 500 billion.

The underlying premise is that accounting has become less effective, if not obsolete, for digital businesses, whose business models are primarily driven by mobilisation and scaling of intangible assets (Govindarajan et al., 2018b). Most digital firms are built on intangible assets such as research and development, peer and supplier networks, customer and social interactions, branding, organisational strategies, computerised data and software, and human capital. Incorporating these intangibles into the financial statement is a significant underrepresentation.

Additionally, the issue of management accountants' competencies deserves consideration. Management accountants' abilities must be adapted to effectively manage and capitalise on digitisation (ICV, 2014; Schäffer & Weber, 2016). Ogoun (2020) argued that the present and future "reality is that only those who anticipate and undertake practical future-directed actions will remain relevant in the next industrial revolution." To achieve this, businesses are encouraged to conduct training measures that impart necessary expertise and methodological knowledge and improve employees' talents in a goal-oriented way (Nobach, 2019).

The relevant skills obtainable by management accountants in engaging in the partnering role with management and other departments should include; IT skills, software skills, BI, Big Data analytical skills, multi-tasking, integrated team approach, agile, and business analytics (ICV, 2014; Heimel & Müller, 2019). The inculcation of these skills is argued to result in minimal waste of resource.

According to the Chartered Global Management Accountant (CGMA, 2014), despite the insurmountable obstacles confronting the MA profession throughout the digital revolution, several perks, potentials, and chances are associated with the digitalisation of MA activities. Also, process automation results in greater efficiency. Automating and offshoring repetitive tasks to shared service centres (SSC) enables the acceleration of planning, forecasting, reporting, and consolidation (Langmann, 2019). Similarly, predictions, analyses, and decision-making are improved since they are based on enhanced data and verified results from predictive analytics and machine learning (Heimel & Müller, 2019). As a result, prognoses are formed correctly via both automation and predictive analytics.

Additionally, mobile solutions provide superior managerial decision-making, particularly when current information is accessed by phone. With the degree of high-quality information available for decision-making, there is an assumption of little risk connected with such a choice. As a result, enormous opportunities for advanced value-adding activities is identified (Becker & Nolte, 2019). As trusted sources of accounting information, management accountants must scale up their professional skill sets to assure data quality, define business needs, and identify essential data to support decisions or monitor performance.

SUMMARY AND CONCLUSION

Digitalisation is a key trend that is in constant advancement and that affects corporate activities in many ways. The effect of digitalisation has kept firms in constant adjustments to keep up with competitors. This paper argues the expediency of skill-set upgrade for management accountants in the contemporary disruptive operating environment. Following the review of MA's status, this paper observes that the status of MA before digitalisation has not gone extinct. This is evident in the stages of MA evolution. Among the four stages of evolution identified by IFAC, the first two stages of cost determination and provision of information for planning reveal MA's existing status before the gradual adoption of digitalisation in most developed countries. The status of MA is redirected and integrated with the last two stages, which is much more useful in the value creation processes for customers, shareholders and the organisation. Also, it has placed management accountants as strategic partners in the decision-making role.

Furthermore, we observe the need to revolutionize the antiquated MA system in the face of digital revolution and strategic gains by firms who embrace digitalisation. Dahal (2019) illustrates that the existence of MA in entities assists management in competitive decision-making by collecting, processing, and conveying data that aid management in planning, managing, and assessing business processes and enterprise strategies. We also observe that among the various dimensions of digitalisation, Big Data, BA, BI, and RPA are the most relevant to MA as they enhance management accountants' value creation role.

The implication of digitalisation for management accountants entails that financial analysts' ability to process internal and external data and segregate essential and reliable data from mere noise efficiently will constitute a key set of new skills. This will require a shift in the management accountant's role towards that of a data scientist, with strong systematic and mathematical-statistical competencies. Also, ability to collaborate and navigate across functional lines will become critical in shoring up continuous relevance. More importantly, the IT department is envisaged as an enabler and support function to the management accountant.

The paper concludes that the huge capital market values of digital businesses such as Facebook, Airbnb, Twitter, and Uber means that the use of accounting information will dwindle in a digital economy dominated by intangible assets. Especially, as these intangibles are greatly underrepresented in the financial statement. Nonetheless, chances for MA still exist as a result of digitisation. When an organisation makes the greatest use of data and information gathered via digitalisation, it gains a competitive edge.

Additionally, leading organisations outperform their rivals when it comes to Big Data, since more research indicates that leading enterprises generate larger returns than their competitors. Therefore, skill-sets upgrade and versatility are the way to go for management accountants to sure up hedging against obsolescence. Hence, future studies should focus on the issues and conflicts that organisations face as a consequence of digitization. Extensive, longitudinal case and field investigations are necessary to expand and clarify our knowledge of this increasingly pervasive problem.

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