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Management Accounting in the Era of Digitalization

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Abstract

Purpose: For the last few decades, human civilization has observed an enormous change due to digitalization. However, question remains whether and how management accounting has been transformed to meet the demand of the digitalization. This paper provides a literary illustration of such transformation in the context of a digitalized world. **Research design, data and methodology:** This is a conceptual study based on extant literature. Therefore, the secondary sources of materials were used. Materials include literatures published in this domain, archival documents, and other publicly available data. **Results:** Drawing from literary evidence, the paper first highlights the evolving character of management accounting. Then it illustrates the changing landscape in the milieu of global and institutional settings with a focus in accounting profession. It further demonstrates the digitalization impact in management accounting. Here it also identifies the changing role of management accountants. **Conclusions:** The paper is critical for the management accounting professionals in identifying the attributes and nature of management accounting in the contemporary world. It also provides a sketch of the potential skillset that management accounting professionals should embrace to tackle the challenges of the new environment.

Keywords : Digitalization, Management Accounting, Management Accountant, Transformation.

JEL Classification Code: M40, M41, M49

1. Introduction

“We must develop a comprehensive and globally shared view of how technology is affecting our lives and reshaping our economic, social, cultural, and human environments. There has never been a time of greater promise, or greater peril.” - *Klaus Schwab, Founder and Executive Chairman, World Economic Forum*

We are now living in an era where technology controls every aspect of our lives (WEF, 2016). The worldwide

pandemic of infectious disease, COVID-19, makes it clear that technology can even save lives. People, while passing quarantine period at their place, have the easy access to the emergency services and facilities just with a connection to the network. Using internet, the business organizations run smooth operations as executives can work from home and attend important business meetings over virtual platforms. Although COVID-19 pandemic has made the technological presence in our lives obvious, the world had for the last few decades witnessed the ever-increasing digitalization of business environment. The Industry 4.0, also known as

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fourth industrial revolution, marks the enormous changes in our business (Morrar, Arman, & Mousa, 2017) with the advancement of information technology. At the basic level, it results in a shift in the modes of production from the mechanistic to the digitized form. The changes, also, incorporate the use of internet with other disruptive technologies in all walks of life (Morrar et al., 2017). Artificial intelligence, big data, cyberspace, informatics, internet of things, robotics etc. have become mundane language in today's business. Management accounting, as an information production mechanism of an organization, has certainly gone through a transformation with the advanced information technology to meet the demand of digitized business environment (Bhimani & Bromwich, 2009). Drawing from literature, this paper provides a brief illustration of the management accounting transformation in the context of the digitalized environment.

The paper has four sections. In the first section, the evolving nature of management accounting is discussed from both conventional and contemporary perspectives. In the next section, the digital transformation is demonstrated in the context of global and institutional settings. Within institutions, the digitalization impact on accounting is also noted here. Thereafter, the third section discusses the management accounting ramifications in the digital world. This section also highlights the need for trust-based management accounting and identifies the role of management accountants in the new setting. Finally, the paper concludes with policy implications while recognizing limitations and future research avenues.

2. Evolving Nature of Management Accounting

In conventional textbooks, management accounting is defined as a branch of accounting that generates and delivers information to the internal decisions makers of an organization. For example, Garrison, Noreen, and Brewer (2018) defines 'managerial accounting is concerned with providing information to managers for use within the organization' (p.2). For them, management accounting assists managers in executing three vital activities of an organization- planning, controlling, and decision making. Similarly, Bhimani et al. (2012) suggests that management accounting analyzes business operations and costs to prepare internal financial report, records and account and support managers' decision-making process in achieving business goals. Thus, in conventional understanding, management accounting performs inward looking functions and has a supplementary role in the external reporting of the organization. The limitations, as identified by many management accounting academics, of this conventional sense is the absence of linkage between organizational

strategy and management accounting functions (Shank, 2007).

To overcome the limitations of conventional management accounting, a new form of management accounting emerged, which is labelled as 'strategic management accounting'. With the increasing business competition and forces of globalization, strategic issues have become crucial for business firms. The business success and failure have seemed to be dependent on the careful execution and implementation of strategies at the corporate, business unit and functional levels of the organization. As a functional discipline, management accounting has thus embraced the strategic management issues in the contents (Wickramasinghe & Alawattage, 2007). Therefore, strategic management accounting has been the response to the strategic turn of the business at least in three ways: first, it shows the clear linkage between organizational strategies and managerial functions; second, it adopts innovative management accounting techniques to produce strategic cost information that ultimately help in achieving the competitive advantage; and third, it considers a dynamic business environment characterized by the enhanced use of information technology (ibid). Although this strategic movement of management accounting has been promoted by leading business schools, professionals, and scholarly works, it does not work if it ignores networks and complex business environment (Shank, 2007; Wickramasinghe & Alawattage, 2007). Therefore, transformation of business environment is an obvious consideration in the design and implementation of management accounting of an organization.

There is ample evidence that management accounting design and systems are influenced not only by micro-organizational features but also by macro socio-political-economic factors (Alawattage, Wickramasinghe, & Uddin, 2017). Depending on the context, management accounting goes beyond the quantified metrics and economic information (Alam, Ranasinghe, & Wickramasinghe, 2019) and implicated in the social fabric. Along with the contextual factors, digitalization has profound effects in the palpability of management accounting. As technology shapes and controls every aspect of our movement, and so do for the business firms, management accounting needs a transformation. Bhimani (2020) suggests that management accounting needs to embrace the multitudes 'as the rise of the internet, mobile technologies and digital economy tools generate depth, breadth and variety of data that far exceed what researchers have had access to in the past' (p.10). In the milieu of digitalization, management accounting should therefore be capable of handling big data generated from the sophisticated information technologies and guide managers in planning and executing operational and strategic

decisions required for the governance, accountability, and control of the organization.

3. Digitalization, the Changing Landscape, and the Accounting Profession

Digitalization or digitization refers to the digital transformation of business. The transformation is driven not only by the adoption of efficient technologies in organizational workflows (e.g. digitalizing paper-based workflows, invoices etc.) but also by the employment of new disruptive technologies in the existing business models (e.g. Uber, booking.com etc.) (Heinzlmann, 2019). The digitalization is so pervasive that ‘no aspect of business today remains untouched by digital technologies.’ (Bhimani & Willcocks, 2014, p.470). Korchagina, Kalinina, Burova, and Ostrovskaya (2020) suggests, upon digital transformation, there should have at least four changes within a business enterprise: first, change in the context in which the company operates; second, change in the relationship of company with key stakeholders (customers, suppliers, contractors, employees etc.); third, change in the business process; and fourth, sophistication added to the products produced or services rendered.

World famous digital analyst, anthropologist and futurist Brian Solis has identified six stages of digital business transformation (cited in Afshar, 2016): a) business as usual, b) present and active, c) formalized, d) strategic, e) converged, and f) innovative and adaptive. At the one end, organizations are complacent with their conventional legacy of customers, processes, metrics, business models and technology believing that this would be sufficient for digital interference. On the other extreme end, digital transformation is acknowledged as continuous, and business is designed to adapt to the changing environment. The ultimate transformation is possible with the active guidance of corporate leadership and the multi-disciplinary involvement of people, operations, technology, and data analytics (ibid).

The digitalization has shaped the institutional settings. The traditional compartmentalized organizations are gradually disrupted with the emergence of a new variety of institutions- a variety that put more emphasis on virtual networks, inter/intra firm relationships, electronic customer relationship management, enterprise resource planning systems (ERPS) etc. (Bhimani & Willcocks, 2014; Wickramasinghe & Alawattage, 2007). This emergent business model is operable on the platform of information network. Anyone with an internet connection and an electronic device (smartphone, laptop, desktop, notebook etc.) can have the access to the products and services of these business. Table-1 represents few of these platform-based

business enterprises with a brief note on their business model.

Apart from the rising of platform-based organizations, digital transformation brings enormous changes within the traditional organizations. Organizations are investing a lot in digital transformation. They are becoming more data centric (Webb, 2020). Almost all the functional areas (such as, accounting and finance, marketing, human resource management, production/operations, research and development and others) of the business are getting influenced by these transformations.

This transformation is affecting both the technical and ethical perspectives of the accounting profession. The process of digital transformation and advancement in digital technologies is ongoing. Therefore, in this ever-changing digital environment, a continuous development of the technical skills is important for the accountants. Webb (2020) commented that though, these days, there are many accountants who are well-versed in older digital technologies such as, spreadsheets and ERP, they find the relatively newer technological issues such as block chain and coding somewhat challenging. Many accountants lack ‘understanding and ambition’ (Webb, 2020, p. 6) in relation to these new skills. However, now it is important to recognize the potentials of the technologies and grab the opportunities. Similarly, Davern, Weisner, and Fraser (2019) highlights three major technologies that worked as the game changers in the accounting profession. These are: (1) Robotic Process Automation (RPA), (2) Block chain and (3) Artificial Intelligence & Data Analytics (AIDA). With RPA, firms can complete some works that are mainly performed by the entry level employees. Thus, the talent of these employees can be utilized for some more value adding activities. Blockchain can provide the security and integrity of data (Davern et al., 2019). Finally, AIDA can help in “finding patterns in data, and thus demands higher degrees of accounting expertise and experience to make sense of the patterns and their implications for business decision-making” (Davern et al., 2019, p. 3). Therefore, these days, it is important for the accountants to gain knowledge related to these technologies.

Digitalization has its impact on almost all the branches of accounting (such as, financial accounting & reporting, cost and management accounting, taxation, auditing, and forensic accounting). According to Webb (2020), the following factors (five Vs) related to technology can affect the finance and accounting profession:

1. Velocity: The speed with which the business environment is changing and need for change is emerging.
2. Volume: The increased volume of technology-based transactions.

3. Value: How important is it to derive the analysis and prediction from the technology-based data (whether

the technology-based data analysis can add value to decision making).

Table 1: Platform Based Business Enterprises

Company	Business Model
Airbnb	A community-based online platform that connects hosts and travelers and facilitates the process of renting without owning any rooms itself.
Amazon	An e-commerce platform where products from Amazon and third parties are sold to the users. It operates just like any other usual e-commerce marketplace – by the interaction of sellers and buyers.
BKash	A solution for Mobile Financial Services, built on a highly scalable Mobile Money platform, Bkash allows the people of Bangladesh to safely send and receive money via mobile devices.
Facebook	As a social media platform, Facebook connects people from all walks of life and across the globe. It is a giant producer of big data. It has always made use of this data to generate revenue from its targeted advertisements.
PayPal	A payment gateway that enables customers to take payments in multiple currencies across the world. People all over the world can accept payments straight into their bank account with just an email id.
TripAdvisor	A US based travel company providing user-generated reviews of travel-related content, which then be used for target customers. Target advertising generates most of its revenues.
Uber	A ride-sharing platform that allows users to book a cab ride from their desired pickup location to the required destination, with the utilization of internet, GPS technologies, and course-plotting technologies.

Source: Authors' Construction

- 4. Variety: The variety of systems and data sources the company needs to use.
- 5. Veracity: It refers to “the reliability, quality, truth and prejudice of the data on which we are basing many business decisions” (Webb, 2020, p. 11).

If these factors are working at a greater extent in an organization (and its business environment), it needs to grab the opportunities from the technological environment and strengthen the skills of its employees.

These technological needs, advancements and changes are critical for the MAC practices of the organizations also. The next section elaborates the implications of digital transformation on MAC practices.

4. Digitalization Impact in Management Accounting

Johnson and Kaplan (1987) raised an issue of ‘relevance lost’ as management accounting in late 1980s was unable to address the need of time. The argument has seemed to be relevant today in the abundance of digitalized organizations (Heinzelmann, 2019). If the management accounting and control (MAC) settings of a business have not been updated in line with its digital transformation, there might have reasons to believe that the information generated from such system would not be relevant for organizational decision making. This section highlights the important techno considerations for the design and implementation of MAC system of a digital organization. It also pinpoints the trust-based management accounting which is critical for managing platform-based network organizations. Moreover,

it illustrates the key skill sets required for management accountants for adaptation in the digital context.

4.1. Techno-considerations for Management Accounting and Control (MAC)

The abundance of digital technologies produces big data in an organization. Consider the case of Facebook. Every share, like, tag, post we make for socialization is data for Facebook Inc. Now, think about millions of Facebook users all over the world. So, it is like a machine that never stops. It is continuously producing data for Facebook Inc which they would further use for target advertising for marketers. Similarly, digital, or digitally transformed organizations are producing bulk data. Managers of those firms must be cautious about the quality/quantity of data. A sophisticated technological setup would enable managers to process bulk data into useful information for operational or strategic decisions. Otherwise, bulk data would lead to a faulty decision (Quattrone, 2016). Following are the technologies that must be considered for the effective design and implementation of MAC system in a digital context.

Table 2: Techno-considerations for MAC

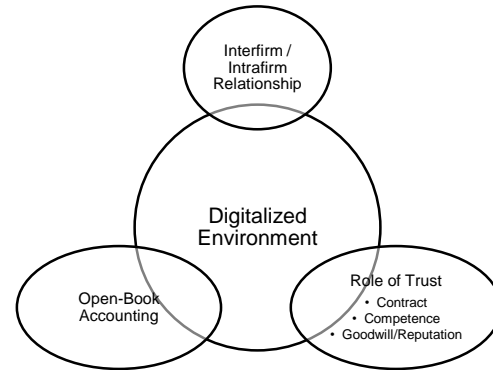
Software Packages/Enterprise Resource Planning (ERP)	A Complete software solution package is installed for the cost management, payroll processing, inventory management, human resource management, customer relationship management, financial report preparation etc.
Cloud Computing	Customized cloud-based solutions are used in control reporting, analytics, monitoring and data governance.
Big Data, Internet of Things (IoT) and Analytics	High-volume, high-velocity, high-variety of structured-unstructured data consisting of emails, messages, social

	media posts, texts, audio, video, image etc. Moreover, the use of IoT (e.g., sensing, self-acting devices) in productions, logistics, and transportation etc. produce huge amount of unstructured data that needs to integrate with structured data. Big data requires new analytics, hence, the emergence of big data analytics to process and generate relevant information from the big data.
Block chain	With the emergence of digital currency, crypto currency, block chain technologies is expected to have an impact in accounting. Besides traditional double entry book-keeping, in blockchain technology, there may be need for a third entry for cryptographic signature for the validity of the transactions. The pervasive effect of blockchain technology in MAC is not clear yet.
Artificial Intelligence	Machine learning and natural language process can be used for better predictions, regular business decisions, vendor selection, cost estimation etc.

Source: Authors' Construction

4.2. Trust-based Management Accounting

As stated elsewhere, the widespread digitalization brings fundamental changes in business operations and models. For such transformation, organizations are increasingly connected with their suppliers/customers through virtual network rather than physical link. This virtual interconnection among the related parties has produced an intricate inter/intra firm association, strong supply chain, joint venture, strategic partnership, and outsourcing relationships. Management accounting has a mediating role in building, maintaining, and sustaining those relationships (see for example, Busco, Riccaboni & Scapens, 2006; Tsamenyi, Qureshi, & Yazdifar, 2013). However, only conventional management accounting techniques are not suitable in network relationships. Along with the traditional tools, trust plays an important role. Although, trust has a multi-dimensional role, we have considered a unidimensional aspect of trust here. That means, we suggest trust has a dominance in the network relations hence it is vital for the inter-connected firms.



Source: Authors' Construction

Figure 1: Trust-based Management Accounting

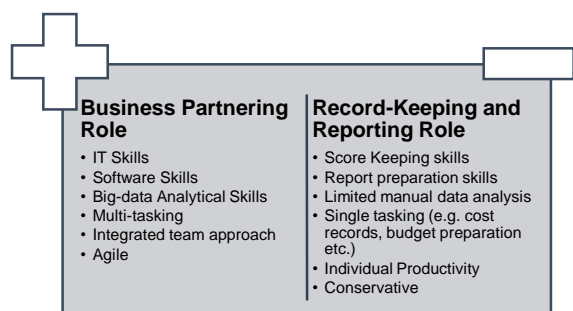
In the context of (management) accounting, Tomkins (2001) defines trust as ‘the adoption of a belief by one party in a relationship that the other party will not act against his or her interests, where this belief is held without undue doubt or suspicion and in the absence of detailed information about the actions of that other party.’ (p. 165). Although it indicates one party’s reliance on others based on personal belief, trust is complicated in nature. Different types of trust can be developed at different stages of a relationship and trust at one stage would help in developing the trust at other level (Tsamenyi et al., 2013). In a digital context, the nature of trust-based management accounting can be understood from the Figure 1.

The company that either install sophisticated technology or embark on a virtual platform develop multitudes of relationships both within and beyond the firm. As mentioned before, trust helps in the development and the retention of those relationships. Trust, for example, is necessary for three levels of inter-firm relationships: contract, competence, and goodwill (Sako, 1992). First, trust is essential for the execution of a business contract. If, for instance, an IT firm enters an outsourcing relationship for the delivery of IT equipment for the digitalization of a business, there will have a contractual (either oral or written) agreement between both parties. The firm authority should have a belief (i.e., trust) that the IT firm will fulfill the contractual conditions. Second, trust is also required for the technical competence of the performing parties (e.g., the suppliers, contractors, vendors etc). Using the same example, the firm should believe in the ability (i.e., trust) of the IT firm in delivering/installing the ordered equipment. Thirdly, trust is vital for the reputation of either parties in the contract. The contracting parties must have a belief that (i.e., trust) both should not only honor the contractual agreements but also go beyond the contractual terms if situation demands. Trust in reputation is required for a sustaining business relationship. The figure also depicts a form of management accounting- open-book accounting in an inter-firm

relationship. Moreover, it has been identified both as a means of improving the cost efficiency of supply chains and as a tool for building trust into customer–supplier relationships (Kajuter & Kulmala, 2005). In general, it means a form of accounting where an organization’s accounts are made open for all pertinent stakeholders of the organization. Practically, in a contract-based work, organization’s accounts are made available to the contractors, and they have been paid based on the transparent records of the costs they have incurred. Therefore, in a network setting where multiple parties are connected for business, open book accounting enables each party to track the records of the transaction. Trust is further essential for the design, development, record, and maintenance of open book accounting.

4.3. Role of Management Accountants

The role of management accountants has also been transformed in the digitalized environment. The traditional skill set may be redundant with the rapid space of digital transformation. CIMA (2019) reports a need for learning technological skills from a survey on UK workers – ‘...a growing appreciation of the need to integrate with technology and be agile – 26% of workers said they think working seamlessly with new technologies will be one of the most important skills.’ Similarly, Beaman and Richardson (2007) expressed their concern that if management accountants failed to learn IT skills and adapt to the digital environment, they would soon become subservient to other professionals. Along with the traditional technical skills, management accountants need to learn a wide variety of soft and IT skills for surviving in the transformed environment. The following diagram (see Figure-2) shows a shift in the role and relevant skills for management accountants due to digital transformation.



Source: Authors' Construction

Figure 2: Changing Role of Management Accountants

With the greater automation of routine tasks and reporting, management accountant seemed to play a business partnering role (Heinzelmann, 2019) in the

digitally transformed environment. They not only need to understand the ERP systems installed within their enterprise but also need an in-depth knowledge of how to feed the produced data in decision making. An enhanced understanding of big data environment, AI, IoT and other IT interfaces are also required. Therefore, IT skills, software skills, big-data analytical skills are positives with compared to the diminishing requirement of record keeping, report preparation and manual data analysis. Moreover, management accountants need to be forward-looking, multi-tasking and empathetic to work in an integrated team environment. This also shows the end of traditional individualistic, inward-looking, and self-centered functionalities of management accountants.

Regarding the digital transformation, Lawson (2019) emphasizes that management accountants should focus on value creation. That is why, they should be participating in “strategy formulation and analysis, planning, and execution” (Lawson, 2019, p. 7). They should also focus on analyzing risk exposure, examining investment decisions to create long term value and communicating the enterprise leaders about the success of the business. Institute of Management Accountants (IMA) highlights that, at this digital age, management accountants need to be ‘future proof’ and develop competencies in the following areas (Lawson, 2019): (1) strategic planning and performance, (2) reporting and control, (3) technology and analytics, (4) leadership, (5) business acumen and operations and (6) professional ethics and value.

It is understood that IMA has considered knowledge on ‘technology and analytics’ as one of the important skills of a management accountants working in a digitalized environment. However, according to Lawson (2019), management accountants serve more like ‘analytic translators’ and they do not have to be ‘data scientists. The role of a data scientist involves “designing a data strategy that’s relevant and manageable and the extraction of information from large quantities of data” (Lawson, 2019, p. 9). The task of a management accountant will be to “communicate with data scientists and technology specialists” and translate the data into business insights (Lawson, 2019, p.10). Thus, the management accountants will mainly try to translate (through analysis) the data generated through the activities of the technical data engineers into the language that is understandable to the managers who deal with marketing, human resource, supply chain, manufacturing, and other functional areas of a business. They act as a bridge between the data engineers and these front-line managers. Thus, in this digitalized business environment, management accountants must possess the skill of ‘data visualization’ and ‘storytelling’ (Lawson, 2019).

5. Conclusions

This paper provides a literary overview of management accounting in the era of digitalization. For the last few decades, the world has observed a massive transformation in business environment. Disruptive technologies have been increasingly used in managing the business operation and platform-oriented business models are abundant to cope with such digital transformation. The paper, thus, explores the question of whether and how management accounting has been transformed to meet the need of the digitalization. The key findings are manifold. First, the traditional conception of management accounting as a decision support system has been changed to an integrated system suitable for strategizing and big-data environment. Second, various technological considerations are important for the design and implementation of such integrated MAC. The issues entail the implementation of ERP, cloud-based technologies, big-data analytics, IoT, blockchain technology, machine learning etc. Third, the digital transformation instigates the rise of platform-based business enterprises where inter/intra-firm arrangements, outsourcing, joint venture, supply chain relationships play the dominant role. In such context, trust is important in executing the MAC functions. Trust-based management accounting is evident at three key levels: contract, competence and reputation. An innovative open-book accounting is also suggested for inter-firm arrangements where associated parties (suppliers, vendors, contractors etc.) are connected through a network of business contracts. The sophisticated information network also facilitates the innovative open-book accounting. Final, there has been change in the professional landscape as well. Management accountants are no more considered as a traditional 'bin-counter' working in their own world and tracking cost records for controlling product or service costs. Instead, management accountants are now in the front-line of digitalized business environment and perform the business partnering role. As such, there is a growing demand for software, IT, big-data analytics, and empathetic skills among the professionals to combat the challenges of digitalized environment.

These findings have important academic implications in many ways. First, it would enable accounting faculties and students to learn about the nature and role of management accounting in the era of digitalization. Second, it would contribute to the growing literature on fourth industrial revolution by drawing evidence from the management accounting field. Thirdly, it would contribute to the literature of interconnected firms by showing how trust plays an important role while firms are connected through web-based networks. Fourthly, the paper would provide a solid conceptual understanding about the needs of management accounting profession in the digital era. Finally,

it would inform accounting researchers about alternative strands of research while they are exploring firms enabling digital features in their operations.

This paper has important policy implications for both global and local professional institute. Globally, Chartered Institute of Management Accountants (CIMA) accredits management accountants while Institute of Cost and Management Accountants of Bangladesh (ICMAB) certifies local management accounting professionals. The paper has important input for both institutes to accommodate in the professional syllabi. Although there is further scope of improvement, CIMA, as a global body, has regularly updated its courses to incorporate the components of digitalized environment. For example, they offer course like 'Managing Finance in a Digital World' at the operational level. In contrary, ICMAB requires more forward-looking curricula and training. Particularly, existing courses should be revised and redesigned to enhance the IT, software, machine learning, data-analytical skills of professionals. Moreover, the prevailing internship program can be made mandatory in a digitalized business environment to provide professionals hand-on experience. This would not only increase the credentials of ICMAB at the global stage but also enhance the employability of CMA professionals in Bangladesh.

Although the paper provides important insights about management accounting and professionals, it has some limitations. The paper is not empirical and based on existing literature. The paper draws evidence from literary sources except few examples of platform-based digital business enterprises. One or few case analyses would provide more practical insights about the MAC practice and the role of management accountants therein. Therefore, future research is expected from academics and practitioners to explore the empirical sites. The researchers may focus on company specific case studies. They might also conduct studies on the practices in a particular economy.

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