Cape Peninsula
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Management accounting professionals' perceptions towards disruptive technologies and emerging competencies

by

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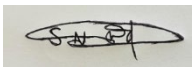
DECLARATION

I, Siphokazi Ngcenge, declare that the contents of this thesis represent my own unaided work, and that the thesis/dissertation has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

		**21 October 2024**
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ABSTRACT

In the current market management accountants are viewed with regards to competencies compared to knowledge. Their failure to adapt could put the profession under scrutiny, leading to it losing its relevance. The profession is evolving due to technological advancements such as Big Data, Data Analytics, Cloud Computing, Artificial Intelligence, and Blockchain. The existing literature has explored the impact of each disruptive technology in management accounting, but a gap still exists regarding the perception of management accounting professionals with regards to disruptive technologies. With regards to competencies, management accounting professional bodies have explored and redefined the profession in their updated competency frameworks. The literature revealed that the role of management accountants is changing, which is contradictory to the finding of this study. Based on the findings, the majority of the management accountants believe that the role of management accountants itself has not changed but its processes and practices are changing. The majority of the management accountants showed knowledge regarding technologies that have an impact on the profession. This clearly underscores a positive outlook to what has been viewed by many authors. This study investigated management accounting professionals' perception of disruptive technologies and emerging competencies in various companies.

The study adopted both the quantitative and qualitative research approach to present a multifaceted view of emerging technologies and competencies. The population in this study included management accountants from all levels in various companies. A purposive sampling method was adopted, complemented by the adoption of non-probability sampling. The researcher distributed 113 questionnaires, and 72 were returned completed while 12 interview requests were sent to senior management accountants, with only 5 interviews conducted. SPSS (latest version) and Thematic Analysis were used to analyse Quantitative and Qualitative data, respectively. The research findings reveal that management accountants are appreciative of what technology innovations offer in streamlining processes and are aware of emerging competencies. This calls for an update in the curriculum in universities by developing a competency-based curriculum to prepare students for the industry and changing business environment. The study recommendations to management accountants in a digital world include prioritisation of professional development, importance of flexibility and adaptation, and familiarity with innovative technologies.

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DEDICATION

To my beloved mother, Mantombi Ngcenge, I await the day we meet again in that glorious morning. To my guardian, Ntombelizwe Elvia Ngcenge, I am profoundly grateful for your unwavering support and love. Your strength and dedication in raising me and my siblings have shaped us into who we are today. You are my inspiration and the epitome of grace and resilience. May God bless you with many more years to witness and enjoy the fruits of your hard work. You are truly a queen in every sense.

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ABBREVIATIONS AND ACRONYMS

Abbreviation/Acronyms

4IR	Fourth Industrial Revolution
MA	Management Accounting
AI	Artificial Intelligence
IoT	Internet of Things
VR	Virtual Reality
MAs	Management Accountants
KAP	Knowledge, Attitude, and Practice
IMA	The Institute of Management Accountants
CIMA	The Chartered Institute of Management Accountants
CC	Cloud Computing
BC	Blockchain
SPSS	Statistical Package for the Social Sciences
VR	Virtual Reality
SA	South Africa
IMA	Institute of Management Accountants
PaaS	Platform-as-a Service
IaaS	Infrastructure-as-a Service

TAM	Technology Acceptance Model
PU	Perceived usefulness
PEOU	Perceived ease of use
BaaE	Blockchain as an Ecosystem
TEA	Triple-Entry Accounting
ERP	Enterprise Resource Planning
IIS	Integrated Information Systems
ICT	Information Technology and Communication
BD	Big Data

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CHAPTER ONE

INTRODUCTION OF THE STUDY

1.1 Introduction

Technology has changed and shaped the way that human activities are done (Coccia, 2020; Bongomin, 2020; Seleke & Chukwuere, 2023; CIPD, 2017). Schwab (2016) refers to these continuous technological changes as the Fourth Industrial Revolution (4IR). Schwab further denotes that there is duplexity on new technologies that are influencing various disciplines in the world. The sentiments by Schwab (2016), concurred with various scholars (Sutherland, 2020 & Rotatori et al, 2021) that the Fourth Industrial revolution is bringing change.

The Industrial Revolution has progressed through distinct phases, beginning with the utilisation of water and steam to mechanise production, followed by the adoption of electricity for mass production, and subsequently the implementation of electronics and information technologies to automate production (Stearn, 2013; Schwab, 2016). Taking it further, Zhang (2019), supported by Hossain (2023) with Seleke and Chukwuere (2023), highlight the recent introduction of new technologies, such as, internet of things (IoT), Artificial Intelligence (AI), robotics and virtual reality (VR), blockchain, machine learning, Big Data, automation, smart devices, cloud technology, 3D printing, and Cloud Computing as the 4IR. Moll and Yigitbasioglu (2019) credit blockchain, Big Data, Cloud Computing, and AI with enhancing the nature of accounting and financial transparency, enabling timely interventions in the accounting field. Even though there are advantages associated with new advances such as data collection cost savings, time savings in data analysis and verification, and streamlining processes (Korhonen et al, 2021), they may also be seen as disruptive because of the challenges they presents such as data trustworthiness, lack of competencies in generating and storing of data, continuous evolution of technology, and loss of relevance of the MA profession (Korhonen et al, 2021).

Kostoff (2004); Dutta and Lawson (2008), define disruptive technologies “as either a new combination of existing technologies or new technologies whose application to problem areas or new commercialisation challenges (e.g., systems or operations) can cause major technology product paradigm shifts or create entirely new ones”. Möller et al. (2020) issued a warning about disruptive technologies, noting that they will cause chaos in various professions, including management accounting, among others. They will disrupt workforce

participation and change the nature of demand and an expectation of what an accountant is, and what it does (Kostoff, 2004; Gould, 2017). According to Bots (2009), “the requirements for the accounting professionals are described more often in terms of competencies than in terms of knowledge”. There are different definitions of competencies from different authors; some of them are listed below:

“A set of observable performance dimensions, including individual knowledge, skills, attitudes, and behaviour, as well as a collective team, process, and organisational capabilities, which are linked to high performance, and provide the organisation with a sustainable competitive advantage (Athey & Orth, 1999)”
“A complex combination of knowledge, skills and abilities demonstrated by organisation members that are critical to the effective and efficient function of the organisation (Nelson et al, 1997)”

The failure of accountants to adequately respond to disruptive technologies and their lack of competence in utilising such technologies is likely to diminish their influence and contribution to management and decision-making processes (Dahal, 2019). This study employs the Knowledge, Attitude, and Practice (KAP) model to evaluate the levels of knowledge, attitudes, and practices concerning disruptive technologies within the MA profession across various companies. The study's objectives were formulated based on the components of the KAP model. KAP studies are designed to collect information about what is known, believed, and practised by a specific population regarding a particular topic (Alhaj, 2018; Andrade, 2020). The application of the KAP model in this study facilitated the identification of knowledge gaps, cultural beliefs, and behavioural patterns among management accountants in relation to disruptive technologies (Cohen & Crabtree, 2006). Moreover, the purpose of this research was to identify the essential skills and capabilities required for management accountants to thrive in an evolving technological landscape.

1.2 Significance of the study

The findings of this study can be significant to many stakeholders such as small firms, employers, MAs, and universities to avoid the failure or irrelevance of the MA profession. Employers and MAs will have a clear understanding of the technologies that will have an impact on the profession and emerging competencies. This will help employers to invest more on skills development programmes and MAs to personal growth. The study will also be significant to universities, as they will now know what is required from MA graduates. The

study will also contribute to the existing knowledge, as there are few studies about disruptive technologies and emerging competencies in the MA profession in South Africa. The findings of the study will also add valuable information to MAs, small accounting firms, and MA professional bodies.

1.3 Research problem statement

The widespread disruptive technology advancement and the real-time organisational demands consistently challenge the MA profession. As a result, organisations are frequently demanding contemporary skill sets and competences that are needed within the dynamic operational finance landscape, and MA professionals are increasingly being judged and evaluated on their ability to adapt and be forward-looking in their roles. Historically, the MA profession has been perceived to be static when it comes to changes in business environment, which has led to the belief that it has lost its relevance (Zainuddin & Sulaiman, 2016; Dahal, 2019). Zainuddin and Sulaiman (2016) highlight internal and external factors that influence MA changes, such as, emerging technologies, economic realities, globalisation and competition. To be responsive and adaptive, organisations need to utilise the knowledge, skills, and resources of all staff in decision making (Bolden and O'Regan, 2016).

The perceived problem investigated in this study is that the prevailing disruptive technologies lay real-time demands which consistently require new competencies for MA professionals, particularly within companies. It is therefore important to identify the emerging competencies of MA as a profession.

1.4 Research aim

To investigate management accounting professionals' perceptions of disruptive technologies and emerging competencies in various companies. To also identify the emerging competencies in the management accounting profession.

1.5 Research objectives

- To investigate the extent of the knowledge gaps in the MA profession regarding disruptive technologies in various companies.
- To examine MA professionals' attitudes towards disruptive technologies in various companies.
- To explore the level of disruptive technologies' implementation in various companies.
- To identify the emerging competencies for the current and future role of MA professionals.

1.6 Research questions

- What is the extent of knowledge gaps in the MA profession regarding disruptive technologies in various companies?
- What is the attitude of MA professionals towards disruptive technologies in various companies?
- What is the level of disruptive technologies' implementation in various companies?
- What are the emerging competencies MA professionals require for current and future roles?

1.7 Literature review

1.7.1 The evolving role of management accountants

Rapid changes in technology have caused significant disruptions across all professions, and the MA profession is no exception (Sunarni, 2013; CIPD, 2017; Jodie & Ogan, 2019). These technological advancements have led to substantial shifts in the roles and responsibilities of MA professionals, effectively redefining the profession. Traditionally, the MA profession involved tasks such as collecting and reporting financial data, preparing budgets, and calculating costs and contribution margins (Aureli, 2017). However, since the 1980s, large-scale technological introductions have enabled MAs to focus more on generating value-added data while delegating repetitive tasks to database technology (Aureli, 2017).

Wolf et al. (2020) underscores several external factors driving changes in the identity of MAs, including professionalisation, university education and research, legislation and compliance, and public image. These factors have necessitated the restructuring of the MA profession. In

response, the Institute of Management Accountants (IMA) (2008) redefined MA 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 the formulation and implementation of an organisation’s strategy.”

1.7.2 Criticisms and challenges facing the management accounting profession

Since the late 1980s, the MA profession has faced criticism for not keeping pace with changes in the business environment (Zainuddin & Sulaiman, 2016; Dahal, 2019). Traditional MA has been criticised for its inward focus on internal processes rather than addressing external issues such as managing competition, creating customer value, and developing competitive advantages (Sunarni, 2013). According to Wessels (2005), many researchers fear that the failure of accountants to respond to technological changes will diminish the influence and contribution of the accounting profession to management. Waweru et al. (2004) highlight several factors that may hinder MA professionals from adapting, including a lack of proper accounting skills, new shareholders, fear of change, and inadequate communication between organisational levels of management.

1.7.3 The changing role of management accountants

The roles of management accountants are evolving due to technological innovations, globalisation, competition, and regulatory changes (Zainuddin & Sulaiman, 2016). Historically, the role of MAs included collecting and reporting financial data based on double-entry bookkeeping, budgeting, and calculating costs and rates of return (Aureli, 2017). However, the changing responsibilities of finance professionals now encompass value creation, providing insight and foresight, and acting as strategically oriented business partners (Lawson, 2019). Despite these evolving roles, MAs have been criticised for their inefficiency and inability to present sound information and reassure decision-makers and users of such information (Kamal, 2015; Zainuddin & Sulaiman, 2016; Dahal, 2019).

According to the International Federation of Accountants (IFAC) (2017), many finance professionals have not fully appreciated or even heard of emerging technologies such as Blockchain. Dahal (2019) warns that the failure of accountants to respond to the changing environment and their lack of competency in using technology is likely to diminish their influence and contribution to management. The MA profession is transitioning from traditional, transaction-based accounting to analytics (Brands, 2015). Disruptive technologies such as Blockchain, Big Data, Cloud Computing, and Artificial Intelligence (AI) are set to transform how MAs analyse and interpret data for their organisations (Brands, 2015).

1.7.4 Disruptive technologies and their impact on industries

Disruptive technologies have brought radical changes across all industries (Marrone & Hazelton, 2019), and the manufacturing industry is no exception, as processes have become more complex (FPTC, 2019). South African manufacturers face numerous challenges, including a lack of necessary skills to participate in the global smart manufacturing economy, insufficient human capital to use data effectively, and a limited understanding of complex technologies and their integration into systems (FPTC, 2019). Research by Worldwide Work indicates that the adoption of the Fourth Industrial Revolution (4IR) in South Africa is low compared to the rest of the world (SAIPA, 2019; Pillay, 2017). In 2019, only 13% of South African corporations were using AI, unchanged from the previous year (SAIPA, 2019). Pillay (2017) highlights connectivity and accessibility as major challenges in Africa and South Africa.

1.7.5 Skills development and the future of management accounting

South Africa is facing a skills shortage, necessitating the re-training of existing professionals and up-skilling the workforce to operate emerging technologies (Pillay, 2017). By 2030, over 50% of the world's approximately 2 billion young people will lack the skills and qualifications needed to participate in the rapidly changing global workforce (Deloitte & Global Business Coalition for Education, 2018). To keep up with the changing world, South Africa must embrace these technologies and invest in skills development programmes.

The MA profession is currently viewed in terms of competencies rather than just knowledge. Boyatzis (2008) defines competency as the capability or ability to do something. Bots (2009) highlighted that the essential requirements for accounting professionals to be competent now consist of cognitive and behavioural skills . Cognitive skills are understood as "the mental actions or processes of acquiring knowledge and understanding through thought, experience, and the senses" (Irene, 2015). Behavioural skills encompass "interpersonal, self-regulatory, and task-related behaviours that connect to successful performance in education and workplace settings" (Elchert et al, 2017). MAs are required to utilise their skills and capabilities not just to provide information but also to participate in decision-making and assist managers in making informed decisions (Ahid & Augustine, 2012). Appelbaum et al (2017) asserts that only MAs with the best analytical capabilities will thrive in this changing environment.

According to Olarewaju (2021), South Africa still employs a very rigid method to qualify accountants, which is not suitable for the Fourth Industrial Revolution (4IR). Disruptive technologies such as data analytics, robotics, and AI will render the traditional role of accountants redundant (Olarewaju, 2021). To prepare management accountants for changes in the business environment, the Chartered Institute of Management Accountants (CIMA) and

the Institute of Management Accountants (IMA) have updated their competency frameworks to include technology and digital skills (CIMA, 2019; IMA, 2019). MA professionals need to embrace and invest in technological advancements through training, re-skilling, and up-skilling.

1.8 Definitions of key concepts

1.8.1 Disruptive technologies

Disruptive technologies are innovations that change the way consumers, industries, and businesses operate. Bower and Christensen (1995) coined the term disruptive technology, in the article titled Disruptive Technologies: Catching the Wave. Disruptive technologies include Internet of things (IoT), Artificial Intelligence (AI), Robotics and Virtual reality (VR), Blockchain, Machine learning, Big Data, Automation, Smart devices, Cloud technology, 3D, Cloud Computing (Seet, 2018; Zhang, 2019). Disruptive technologies will drive industry growth, and create new markets through the development of cheaper, better, and more accessible products and services (Kostoff, 2004; Mookerjee, 2021; Martínez-Vergara, 2021). Disruptive technologies will bring business opportunities, as well as challenges for companies, regardless of the industry in which they operate (Schiavi & Behr, 2018). This study will focus on technologies that will have an impact in the MA profession, such as Blockchain, Cloud Computing, Big Data, and Artificial Intelligence.

1.8.1.1 Big Data (BD)

The term "Big Data" was coined in the mid-1990s at Silicon Graphics Inc. (SGI) during a lunch-table conversation, in which John Machey figured prominently (Diebold, 2012; Wang, 2016). Big Data is defined as “a *large amount of data which requires new technologies and architectures so that it becomes possible to extract value from it by capturing an analysis process* (Katal et al, 2013). Sledgianowski (2017); Katal et al (2013) “Big Data is described as a set of data that contains large amounts of data of different structures that traditional technologies and information systems are poorly processed and analysed”. Big Data is characterised by volume, velocity, veracity, and variety (Sledgianowski, 2017; Gartner & Hiebl, 2017). Katal, (2013) highlights some of the challenges that come with Big Data, such as privacy and security issues, data access and sharing of information, storage and processing issues, analytical challenges, skill requirements, and technical changes.

1.8.1.2 Cloud Computing (CC)

Mell and Grance (2009) in Termedi (2014) define Cloud Computing as "*a model for enabling convenient, on-demand network access to share a pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction*". Cloud Computing refers to delivering computer hardware and software application services via the Internet (Dimitriu & Matei, 2014). Users are allowed to keep data and access applications through different devices located in several locations (Dimitriu & Matei, 2014). Ruiz-Agundez et al (2012); Purcell (2014); Asatiani and Penttinen (2015); Yangyang (2019) highlights three service models of Cloud Computing as Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS). Asatiani and Penttinen (2015) also highlight two cloud deployment models as private and public cloud. Private clouds offer a high degree of control over data service, security, and privacy. The provider controls public cloud as services are deployed and maintained by the cloud provider within its own infrastructure.

1.8.1.3 Artificial Intelligence (AI)

Artificial Intelligence's focus is to comprehend and perform intelligent tasks such as reasoning, learning new abilities and adapting to new situations and difficulties (Mogali, 2014). AI is the simulation of human intelligence in machines that are programmed to think and act in human-like ways (Franenfield, 2020). Kaya (2019), AI combines cognitive automation, machine learning, reasoning, hypothesis building and analysis, natural language processing, and algorithm mutations to create insights and analyses that match or exceed human capabilities. AI involves many scientific fields such as computer science, psychology, physiology, philosophy, and mathematics (Mogali, 2014; Lufeng, 2018). Mogali (2014) highlights three areas of AI as expert systems, natural language, and pattern recognition. Expert system is a computer programme that gives expert advice, decisions, or possible solutions for arising situations. Natural language processing focuses on designing and building computers that analyse, understand, and generate language that humans use naturally. Pattern recognition is based on prior knowledge or statistics extracted from the pattern.

1.8.1.4 Blockchain (BC)

Satoshi Nakamoto invented the blockchain in 2008 to function as the public ledger of the crypto currency bitcoin. Blockchain are distributed digital ledgers of transactions that are cryptographically signed, organised into blocks (Saberi, 2019). The database is shared with a series of data that is time-stamped and unchangeable (Kruskopf et al, 2020). According to Kruskopf et al (2020); Rückeshäuser (2017) blockchain is a decentralised system, no one controls the systems.

1.8.1.5 Knowledge, Attitude, and Practices (KAP)

A KAP study is conducted on a specific group to obtain information about what is known, believed, and done in connection with a given topic (Alhaj, 2018). KAP study was first invented in the 1950's and was commonly used in the health education field (Marathe, 2016). Now, the study is used in other fields to study human behaviour when affected by a problem (Marathe, 2016). Knowledge measures the knowledge of individuals about the problem. Attitude measures the feelings and beliefs of individuals regarding the problem. Practices, measures behaviours that individuals follow to avoid a problem (Marathe, 2016).

1.9 Research methodology

In pursuit of understanding MA professionals' perceptions on disruptive technologies and emerging competencies, it was necessary to employ methodical and structured approaches to guide the study.

1.9.1 Research approach

This study adopted the mixed approach to have a multifaceted view of emerging technologies and competencies that are affecting MA professionals. The intent of gathering both qualitative and quantitative data at the same time and integrating the data is to best understand the research problem by employing the advantages of both methods (Creswell et al, 2004; Taherdoost, 2022).

1.9.2 Research design

The study adopted a cross-sectional research design strategy for data collection to ensure that the research problem is thoroughly investigated. According to Al-Ababneh (2020), cross-section data ''is collected just once over a short period of time, it takes a snapshot of an on-going situation''. Cross-sectional was deemed suitable for this study as the researcher aims to evaluate the level of knowledge, attitudes, and practices about disruptive technologies in the MA profession at a specific time point as technological innovation is an on-going phenomenon.

1.9.3 Population

Population is the total of all the objects, subjects or members that conform to a set of specifications to whom the researcher wants to draw conclusions (Benjeh & Jaradat, 2018). Consequently, the population of this study included accounting professionals who were the objects that the researcher wanted to gather information from about the research phenomenon. This helped the researcher to identify individuals who share the same characteristics and to develop a sample for the study.

1.9.4 Research sample

In this study the total number of MA professionals was unknown; therefore, the researcher employed a purposive sampling technique due to the unavailability of information regarding the complete scope of the study's population. A sample of 125 respondents was meticulously selected, consisting of 12 interviewees and 113 questionnaires. However, due to constraints beyond the researcher’s control, including financial limitations and the restrictive nature of the profession and its ethical protocols, only 72 questionnaires were completed, with 5 semi-structured interviews conducted.

1.9.5 Data collection and analysis

To tackle the quantitative aspect, closed-ended and open-ended questionnaires were electronically distributed to MA professionals through their mailboxes and LinkedIn messages. Due to financial constraints and geographically diverse participants, this form of communication was deemed suitable. Quantitative data was analysed by SPSS version 26.0. Qualitative data collection involved conducting one-on-one Teams interviews with senior MA professionals in selected companies. Qualitative data analysis was accomplished using thematic analysis.

1.9.6 Limitations of the study

According to Theofanidis and Fountouki (2018), limitations concern potential drawbacks that are usually out of the researcher’s control which are associated with various factors. Limitation may affect the study design, results, and conclusions; therefore, they should be acknowledged in the paper (Theofanidis & Fountouki, 2018). The limitation encountered by the researcher was lack of interest in participation by companies and management accountants. Furthermore, there was a low return of questionnaires, and some participants did not arrive for scheduled interviews.

1.9.7 Ethical consideration

Ethical consideration is a way of conducting research in an acceptable manner which does not seek to discriminate against people's rights (Merten & Ginsberg, 2009). The researcher requested permission to conduct the research with all participants. Letters of approval were obtained from all parties and respondents involved in this study and an ethical clearance certificate (2022_FBMSREC 036) was obtained from the Cape Peninsula University of Technology's ethics committee using university ethical clearance guidelines (see Appendix A).

1.10 Thesis outline

Chapter One presents an introduction of what the study entails. It outlines the significance of the study, the research problem statement which identified the existing gap, the research aim, objectives, and the questions which guided the study. The chapter further discussed methodologies employed by the study to collect and analyse data.

Chapter Two explores existing and relevant literature to the study. The purpose was to gain a comprehensive understanding of the role of management accountants in a digital world and how they could prepare themselves to maintain relevance with the changes in the environment. Secondary data was used to gather information.

Chapter Three outlines the methodology used in conducting the study. It provides the introduction of the chapter which emphasises the importance of the selection of the research methodology. The chapter further discusses the paradigm (epistemological) and approach (concurrent mixed approach) employed in the study. It also discusses research design, population and sampling, data collection instruments, and analysis. Lastly, it discusses the ethical considerations and the chapter summary.

Chapter Four outlines the analysis and interpretation of results gathered during the data collection phase. Firstly, Section A analysed quantitative data using SPSS software. Section B further analysed qualitative data using thematic analysis.

Chapter Five discusses the conclusions and recommendations drawn from the study based on each research objective as stated in ChapterOne1. The chapter further discusses the future research direction to close the gap between industries and universities.

1.11 Chapter summary

This chapter outlined the introduction to the study, significance of the study, and the problem investigated in this study. This chapter also provided research questions to achieve the objectives of the study. Furthermore, research methodology and limitations are included in this chapter. Lastly, this chapter gives the direction of the study on the inquiry being conducted. The next chapter, Literature Review, evaluated existing literature to discover new knowledge, arguments, and discrepancies regarding the perception of MA professionals about disruptive technologies. In the following section (Chapter Two), the study will look at the existing literature and theoretical framework that aligns with the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The previous section (Chapter One) provided the introduction, the background and the study outline. In this chapter, the evolution of MA in the digital age is explored, highlighting the significant impact of technological advancements on the profession. Traditionally focused on financial data collection and reporting, management accountants now face a redefined role due to advancements in technology. The introduction of technologies such as Artificial Intelligence, Big Data, Blockchain, and Cloud Computing have reshaped the profession, allowing accountants to focus on value-added tasks and decision support rather than routine data collection. The integration of these disruptive technologies presents challenges and opportunities for management accountants, requiring them to adapt and develop new skills to thrive in the digital era. The chapter also emphasises the importance of risk management in the MA profession, as well as the need for continuous learning and upskilling to stay relevant in a rapidly changing business environment.

2.2 Theoretical frameworks

2.2.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) can be traced back to Davis (1989), who developed this theoretical framework to address two primary questions: (1) Why do end-users accept or reject information systems, and (2) How do the design features of a system influence user acceptance? TAM emphasises the causal interrelationship between system design features, perceived usefulness (PU), perceived ease of use (PEOU), attitude towards usage, and actual usage behaviour (Davis, 1989). Marangunić (2015) posits that TAM has become a predominant model for explaining user behaviour towards technology. This study employs the TAM framework to explore MAs' perceptions of disruptive technologies, which in turn shape their attitudes towards these technologies. The focus is on technologies that significantly impact the MA profession, including Big Bata, Artificial Intelligence, Cloud Computing, and Blockchain.

TAM provides a systematic approach to investigating MAs' perceptions and the factors that lead to the acceptance or rejection of the aforementioned technologies. Perceived usefulness (PU) is influenced by the benefits derived from using a technology. For individuals to accept or reject a technology, they need to comprehend its usefulness and understand how it will

enhance their lives or work (Ibrahim et al., 2017; Julianto & Yasa, 2019). MAs are inclined to adopt technologies that enhance their processes and improve decision-making (Souza et al., 2017). Furthermore, the PU of a specific technology affects an individual's attitude towards that technology (Ibrahim et al., 2017; Julianto & Yasa, 2019). For example, if MAs perceive the benefits of adopting Big Data, their attitude towards Big Data will be positive.

PEOU is also closely linked to users' attitudes towards technology. If a technology is user-friendly, users are more likely to adopt it with a positive outlook (Julianto & Yasa, 2019). In the context of MAs, PU and PEOU are critical in determining the adoption of technology in their daily work. Both PU and PEOU are influenced by the users' attitudes and behaviours towards a particular technology. Consequently, it is essential for MAs to maintain a positive attitude towards the technologies introduced in their profession. This positive attitude can be fostered through lifelong learning, professional development, and staying informed about developments in the business environment.

2.3 Evolution of the finance role of management accounting

Rapid changes in technology have caused major disruptions in all professions, and the MA profession is no exception (Prawisatari, 2022; Kroon, 2021; Tiron-Tudor & Deliu, 2021). Andreassen (2020), states that technological advancements have brought significant shifts in the role and responsibility of MA professionals, which resulted in the profession being redefined. Traditionally, the MA profession involved the collection and reporting of financial data, budgets preparation, calculation of costs, and contribution margins (Aureli, 2017). However, in the 1980s technology was introduced on a large scale which allowed MAs to focus more on generating value-added data and allocate repetitive tasks to database technology (Aureli, 2017). Taking it further, Andreassen (2020), underscores that the role of MAs has been categorised into two stereotypes: bean-counters and business partners.

According to Samanthi and Gooneratne (2023), bean-counters are individuals who mainly focus on capturing, tracking, and reporting on the financial information of an organisation. The primary role for bean-counters is to maintain the financial integrity of an organisation by managing costs and financial compliance so as to allocate the right budget, and ensure that financial statements are correct and accurate. Bean counters' tasks are associated with practical tasks such as measuring and bookkeeping. Unlike bean counters, the business partners' role is to help and guide the organisation to make informed strategic decisions. Business partners use the financial information to support their decisions. It is important to note that business partners require good communication skills, the ability to translate financial information and convert those into actionable business insights.

Advancements in technology have expanded the scope of accountants, as routine tasks like data collection and calculations are now handled by enterprise resource planning (ERP) systems and integrated information systems (IIS), enabling Management Accountants (MAs) to concentrate on supporting decision-makers (Mancini et al., 2021; Andreassen, 2020). Consequently, MAs are encouraged to move beyond traditional core competencies such as reporting, control, strategic management, and leadership (Kroon, 2021), and instead focus on developing skills in technology and analytics to enhance their contributions to organisational success (Jackson, 2023).

Traditional MA has also been criticised for focusing on internal processes rather than addressing external issues such as managing competition, creating customer value, and creating competitive advantage (Sunarni, 2013). According to Wessels (2005), many researchers fear that the failure of accountants in responding to the changes posed by technologies is likely to diminish the influence of the accounting profession and their contribution to management. Waweru (2004) highlights a few factors that may make it difficult for MA professionals to change. These factors include lack of proper accounting skills, new shareholders, fear of change, and lack of communication between organisational levels of management. Andreassen's (2020), findings reveal that digital technology has made an immense contribution to the changes in the roles of MAs heterogeneously as the profession competes for tasks and influence on the boundaries of MA roles. The researcher focused on technologies that have a major potential to disrupt MA profession, and these include Artificial Intelligence, Big Data, Blockchain, and Cloud Computing (Jodie & Ogan, 2019).

These new skill areas have led to the redefinition of the profession by one of the MA professional institutions, The Institute of Management Accountants (IMA). IMA (2008), redefined MA 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 the formulation and implementation of an organisation's strategy".* According to Andreassen (2020); Kroon (2021), the role of MA has been researched by many authors in recent decades and remains an ongoing area of research. However, there are several knowledge gaps that researchers need to address, for example there is a lack of research about the integration of technology into the MA profession (discussed in 2.3); risk management and the need to involve MA in strategic decision making.

2.4 Management accounting as a risk management activity

As mentioned above, MA roles traditionally involve the collection and reporting of financial data, budget preparation, calculation of costs, and contribution margins. It is important to note that the management of risk forms an important aspect of the MA profession (Power, 2004). Risk management is the process of identifying, assessing, and prioritising risks to minimise impacts that could impact the organisation in a negative way. There have been studies conducted to explore the relationship between MA and risk management. For example, effective MA practices can play a crucial role in supporting risk management efforts within an organisation (Bento et al, 2018; Catanzaro & Teyssier, 2021). It is also important to note that there is a limited body of knowledge to discuss the importance of risk management in MA.

Zaleha et al, (2011:566), notes that there are few studies which have examined the significant link between MA and risk management. Even though this study seeks to investigate MA professionals' perceptions of disruptive technologies and emerging competencies in various companies, the researcher recognises the role of risk management in the MA profession. As previously mentioned, the MAs can provide valuable information and insights to support effective risk management strategies within organisations. Therefore, there is a need to close the knowledge gap because the integration of the two (risk management and MA) can provide insight into how risk management can help MAs and organisations to make informed strategic decisions (Braumann et al, 2020; Nielsen, 2022).

2.5 Advanced and disruptive technologies and their impact on industries

Disruptive technologies have brought radical changes to all industries, and the manufacturing industry is one of these as processes have become more complicated (FPTC, 2019). South African manufacturers are facing many challenges such as the lack of necessary skills to participate in the global smart manufacturing economy, lack of human capital required to use data effectively, and the understanding of complex technologies and how to integrate these into their systems (FPTC, 2019). According to research by Worldwide Work, the adoption of 4IR in SA is low compared to the rest of the world (SAIPA, 2019; Pillay, Ori & Merkofer, 2017). In 2019 only 13% of SA corporates were using AI, and this has not changed from the previous year's results (SAIPA, 2019). Pillay et al (2017) highlight connectivity and accessibility as the biggest challenges in Africa/South Africa. South Africa is also facing a skills shortage, with a call for re-training of existing professionals or up-skilling the workforce to be able to operate these technologies (Pillay et al, 2017). By 2030, more than 50% of the world's approximately

2 billion young people will not have the skills and qualifications needed to participate in the rapidly changing global workforce (Deloitte & Global Business Coalition for Education, 2018).

The adoption and implementation of disruptive technologies in South Africa is hindered by a lack of infrastructure, and this affects different sectors, especially those in connectivity services and manufacturing (Alexander, 2022). According to CeSTII (2020) in Alexander (2021), between 2014 and 2016, the lack of infrastructure was rated as one of the barriers to innovation by business in the services sector and industry. Alexander (2021) underscores an important view on the issue of infrastructure by stating that “the growth of 4IR systems will make connectivity infrastructure more important for all businesses”. Notably, information communication technology (ICT) infrastructure, dependent on both energy and internet connections, can efficiently enhance data sharing which is a key component of many 4IR systems. As a result, shortcomings in the current infrastructure systems present a significant opportunity for the development of 4IR systems (Alexander, 2021). Notably, even when advanced infrastructure is not available, businesses can implement 4IR systems.

On the South African context, tailored solutions can be developed to address the issue of lack of infrastructure. Innovative systems can be constructed to support different levels of infrastructure. The changes in the business environment are forcing everyone to embrace and invest in digital technologies regardless of the state of the infrastructure, as clients and customers are demanding value-adding services (Sage, 2020). In a report by Sage (2020), 90% of SA accountants agreed that new technologies have forced them to invest more at a high speed to keep up with the changes. According to Sage (2020), SA accountants highlighted the benefits of technology adoption such as efficiency in time and productivity, and reduced costs.

2.6 Examples of advanced technologies with significant disruptive potential

The continued advancements in technology are changing the direction of the accounting field. In the last few decades, rapid advances in technologies have triggered several changes in the business environment. These changes have been driven by powerful computing, connecting devices, and the availability of the internet. These technologies are under the industry 4.0 umbrella, which is characterised by its speed, scale, complexity, and transformative powers compared to other industrial revolutions (Bongomin, 2020). They include but are not limited to Internet of Things (IoT), Big Data (BD), 3D printing, Cloud Computing (CC), Blockchain, Autonomous robots, Virtual and Augmented reality, Cyber-physical system, Artificial Intelligence, Smart sensors, Simulation, Nanotechnology, Drones, and Biotechnology (Seet,

2018; Bongomin, 2020; Zhang, 2019). Many authors such as Arkhipova (2024) highlight technologies that have significant impact in the MA profession, and these include BD analytics, CC, IoT and AI. These technologies may be interconnected, such as AI is complemented by BD technologies, AI becomes efficient as the volume of data acquired increases (Arkhipova, 2024). BD is useful only when supported by software to analyse it. Both these technologies are efficient in collection and make meaning of the data provided by devices connected by the internet.

These technological advances have been affecting the general business environment as well as the function of business, such as the accounting functions in business firms. Both financial and MA practices have already been affected by these changes in technology. Furthermore, emerging disruptive technologies are changing the business world and shifting many of the traditional business practices to new practices. Business enterprises are managing their resources, services, products, and markets in new ways through these evolved disruptive technologies. Indeed, these disruptive technologies can create new practices in the business world and new methods of accounting practices. While emerging technologies provide a tremendous number of opportunities to the business world, they also disrupt traditional business models (Kivimaa, 2021). Indeed, emerging technologies have initiated discussions about how many jobs or parts could potentially be integrated by machines and robots, as well as how technologies are revolutionising many of the business world practices. The impacts of these emerging technologies on the business world have been reported to include intensified competition in the global markets, new methods for accounting practices, shifts in traditional business processes, and new business opportunities in various areas of the business world (Kivimaa, 2021; Bongomin, 2020; Frizzo-Barker, 2020)

2.6.1 Artificial Intelligence

According to BPP (2022), AI is a computer system that has an ability to assist a human operator in make business decisions or solving problems. Automation and AI rely on harnessing the ability of computers to learn, make judgments and perform actions based on those judgments. This lowers the need for human involvement in some business operations, lowering costs and providing efficient processes that add more value (BPP 2022; Jodie & Ogan, 2019).

Artificial Intelligence, as a crucial player in the current wave of scientific and technological advancement, is moving from research and development to practical implementation in industries, emerging as a powerful catalyst for global economic growth (Luo et al, 2018). With

China's economy entering a new phase and the government's commitment to fostering the Artificial Intelligence sector, the accounting industry must also prioritise the integration of Artificial Intelligence into its reform and innovation endeavours. Enterprises must seize the opportunities presented by the new era by leveraging innovative information technologies, with intelligent finance and accounting undoubtedly representing the future trajectory (Luo et al, 2018). To successfully promote the application of Artificial Intelligence in accounting, collaboration between the government, enterprises, universities, individuals, and other stakeholders is essential (Luo et al, 2018). Moreover, addressing challenges that arise during the implementation process is crucial to ensure effective utilisation of Artificial Intelligence in accounting (Luo et al, 2018).

The development of AI is a consequence of societal and economic development (Li & Zheng, 2018). It has transformed conventional accounting practices, but it does not signify the end of human involvement in accounting. Instead, the emergence of Artificial Intelligence presents an opportunity rather than a challenge for the accounting industry and accountants (Li & Zheng, 2018). While some accountants have experienced job loss due to the introduction of Artificial Intelligence, it will not ultimately replace accountants. This situation necessitates accounting professionals to adopt a positive perspective on Artificial Intelligence, continuously enhance their skills, and transition from traditional accounting roles to managerial and high-level positions (Li & Zheng, 2018). Accountants should proactively adjust to societal advancements, innovate, transform themselves, continuously update their knowledge, and become irreplaceable high-quality accountants (Li & Zheng, 2018).

2.6.2 Big Data

The term “Big Data” is used to represent the large volumes of data processed from multiple sources, such as web browsing, social media, sensors, etc, that can be analysed to reveal patterns or trends, particularly relating to human behaviour or interactions (BPP, 2022. According to Thakuriah (2015), big data “*refers to structured and unstructured data generated naturally as a part of transactional, operational, planning and social activities, or the linkage of such data to purposefully designed data*”. BD can be characterised by its features known as 4Vs which are large volume, velocity (speed), variety (different forms), and veracity (trustworthiness) (BPP, 2022); (Tiron-Tudor & Deliu, 2021). **Large Volume** refers to the quantity and size of data available that determines the value and potential insights (BPP, 2022); (Tiron-Tudor & Deliu, 2021). **Velocity** refers to the speed at which Big Data can be accessed by an organisation, with data being available in real-time (BPP, 2022); (Tiron-Tudor & Deliu, 2021). **Variety** refers to various forms of data that can include both structure and unstructured data. Unstructured data can take many forms including free text, images, and

audios, with intense data analysis (BPP, 2022). **Veracity** refers to the trustworthiness and accuracy of data and whether it can be trusted (Tiron-Tudor & Deliu, 2021). Tiron-Tudor and Deliu's (2021), paper underscores other characteristic of BD which includes "**exhaustiveness**, the ability to capture and record the entire system, with BD including (or not) all the available data from sources, **extensionality** showing the possibility of quickly adding and easily changing new fields in each element of the data collected, and **scalability** the BD storage system's ability to expand rapidly".

BD is changing the roles of MAs through tasks and responsibilities (Tiron-Tudor & Deliu, 2021). MA is going through a rapid and volatile period, and the challenges faced by professionals have intensified (Feng & Zhong, 2022). Literature argues that Big Data can be quantified as a big shift in MA that affects future requirements of this profession. The swift transition from traditional MA into data MA will raise concerns on education and training practices. Admittedly, the profession has already acknowledged that the rise of Industry 4.0 creates additional workload and expectations for the professionals (Bhadani & Jothimani, 2017). What is more concerning is that these professionals will be regarded as "blockers" or as unproductive, unqualified personnel if they are incapable of managing work processes related to Big Data management. If these issues cannot be resolved, hiring Big Data professionals, or outsourcing Big Data management functions will become more common and accepted by public accounting firms.

2.6.3 Blockchain

The term "blockchain" was invented by Satoshi Nakamoto in 2008 to function as the public ledger of the cryptocurrency Bitcoin. Radu (2020), describes blockchain "*as a distributed, replicated, and secure digital register that allows contracting parties to see a system of records that are immutable*". According to Radu (2020), this technology has progressed faster, and has reached version 4.0, with the aim to integrate into the market to meet users' needs with various platforms. Blockchain are distributed digital ledgers of transactions that are cryptgraphically signed, and organised into blocks (Saberi, 2019). According to Kruskopf, (2020); Rückeshäuser (2017); Frizzo-Barker, (2020), blockchain is a decentralised system, no one controls the systems. It is a digital ledger that enables peer-to-peer value transfers of all kinds; this includes physical commodities and land titles, without the need for an intermediary such as banks, accountants, or lawyers (Frizzo-Barker, 2020). It is shared with a series of data that is time-stamped and unchangeable (Kruskopf, 2020). This is supported by Frizzo-Barker (2020), who underscores that blockchain's aim is to enhance efficiency, transparency, and

security, across all business and social transactions. Frizzo-Barker (2020) highlighted a few benefits offered by blockchain which includes, its trust-free and transparent nature, decentralised structure, improved business efficiency, lower transaction costs, financial benefits, security, privacy, and data ownership. Furthermore, Frizzo-Barker (2020), underscored the challenges and risks presented by blockchain as mentioned by 41% of papers in their systematic review, and these include scalability, reliability, volatility, security, wasted resources, negative environmental impact, and lack of universal standards.

Kitsantas and Chytis (2022), introduced and explored the deployment of an innovative architecture of Blockchain as an Ecosystem (BaaE) platform in the context of Triple-Entry Accounting (TEA) that could transform current accounting practises, cost management, supply chain, and inventory management systems. Kitsantas and Chytis (2022), highlight ways in which BaaE through TEA could automate accounting transactions and records, removing the need for third parties and enabling a real-time, verifiable, and transparent accounting ecosystem. These blockchain applications have the potential to change traditional accounting and management practices by providing transparency, security, efficiency, and traceability in processes. This is supported by Al-Zaqeba et al (2022), which states that blockchain and distributed ledger technology will increase the efficiency of accounting data recording that ensures integrity and detects fraud in different operations and reduces both the cost and time of sharing accounting information.

2.6.4 Cloud Computing

BPP (2022) explains Cloud Computing as a consumable service instead of as a purchased product as it enables system information and software to be accessed by computers remotely as a utility through the internet. A CC application that is specific to finance functions is cloud accounting, a software to process financial transactions and provide management reports as if software is installed in their computers (e.g., QuickBooks, Xero and Sage) (BPP, 2022). Alouffi et al (2021), states that CC has merged from the distributed software architecture. CC technology's aim is to provide hosted services over the internet. CC services are provided from data centres located in different parts of the world e.g., Sharepoint and Google applications (Alouffi et al, (2021). Alouffi, (2021), highlights four Cloud Computing models, supported by Fu (2022), with three Cloud Computing models.

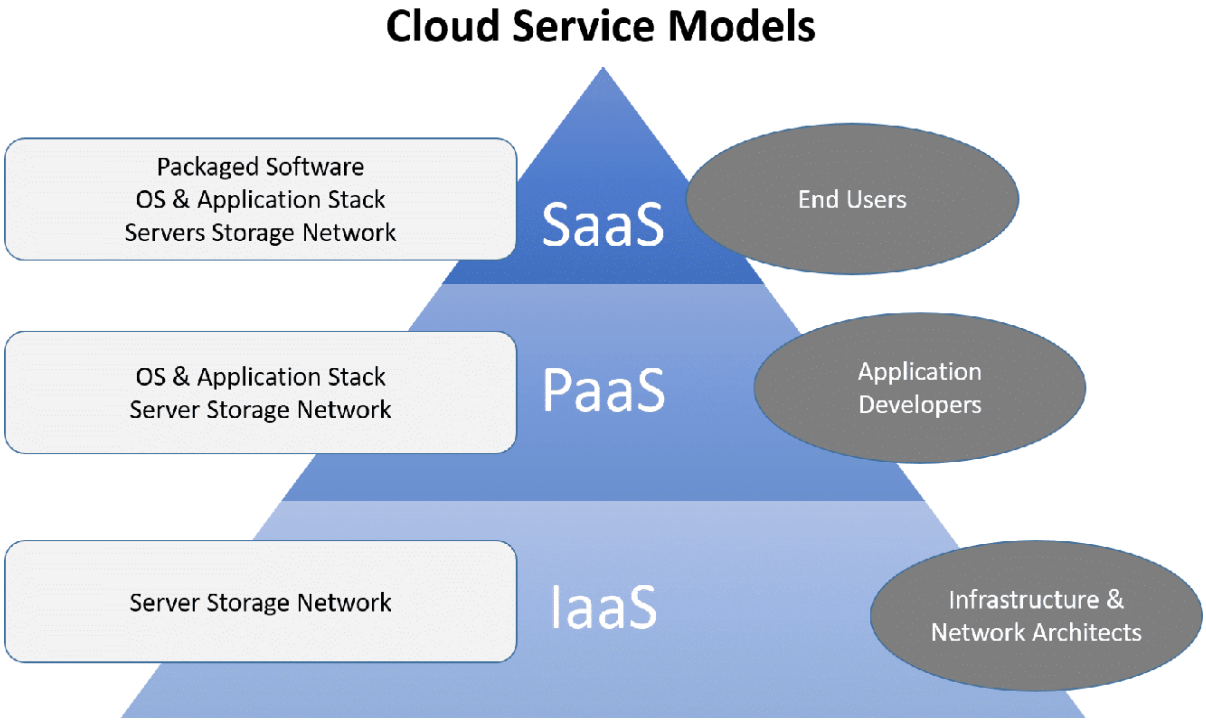

Figure 1: Cloud Computing models

(Fu, 2022)

Figure 1.1 shows the three common types of Cloud Computing models. Infrastructure as a Service (IaaS) is supplied as a platform in an online world. Members are not obliged to purchase servers, data centre, network equipment or space (Fu, 2022). Platform as a Service (PaaS) supports a full software life cycle and enables customers to create cloud applications and services (Fu, 2022). There is no need to purchase the software. The intermediary's equipment is used to deliver the developed applications to clients via the internet. Software as a Service (SaaS) allows customers to access software and other programs over the cloud. In-house applications, data storage, and application administrative support are no longer required with SaaS solutions (Fu, 2022). Organisations pay to use the SaaS on a user basis. Alouffi (2021), noted that the fourth CC model, Container as a Service (CaaS), was developed to resolve application development issues in the PaaS environment. CaaS is aimed to free the applications by making them independent of PaaS environment specifications. According to FU (2022), organisations can adopt one of the following cloud deployments:

- Public cloud is for public use. The customers have no control over the location cost shared by all users, it is either free or in the form of a licence.
- Private cloud, the infrastructure is used by one organisation. The benefit of private cloud includes that organisations have control over security and data safeguarded by

a firewall and managed internally. It is best for organisations with high security demands.

- Hybrid cloud uses both the private and public cloud but they can remain separate entities. Resources are managed and can be provided by internal or external providers. It is great for scalability, flexibility, and security e.g., organisations can use public cloud to interact with customers while keeping their data secured through a private cloud.
- The community cloud is an infrastructure collectively utilised by organisations within a certain community. The community members share similar privacy, performance, and security concerns.

According to Khaliq (2021), studies highlighted the function of Cloud Computing in providing a better way to acquire information, with the increase in size, speed, and volume of data handling. CC will improve the speed and quality of decision making throughout the organisation. Kristandl et al (2014), agrees with Khaliq (2021), that CC provides access to information for decision-making through new methods such as smart devices. Shi (2021) pointed out that CC is a distributed computing architecture. By shifting application computing from the central server to the edge nodes of the network, data can be processed effectively and reduce central server dependence (Shi, 2021). This feature can effectively solve data processing complications by improving data availability, speed, and accuracy for strategic management accounting, which are critical for strategic decision-making (Shi, 2021).

Cloud accounting software could bring more flexibility to small and medium-sized enterprises by improving efficiency in accounting processes (Atanasovski & Tocev, 2022). Atanasovski & Tocev (2022), also highlight that ERP systems for big companies are evolving and vendors are moving their solutions from a company storage to the emerging cloud technology. Every technology comes with its drawbacks and Cloud Computing is not immune. Foremost, the service provider’s reliability and internet reliability are the major concerns (Atanasovski & Tocev, 2022). Security and confidentiality are also major concerns for companies as a third party is used as a service provider (Atanasovski & Tocev, 2022).

2.7 Emerging competencies in the field of management accounting

The MA profession currently is viewed with regards to competencies as compared to knowledge. This view has raised some questions about the relevance of MA's current competencies in a digital environment (Arkhipova., 2024). Arkhipova (2024) outlines two directions taken by academic research on the importance of Information Technology and Communication (ICT) competence in the accounting field. The first directions emphasised the need for MAs to remain relevant by embracing and developing specialised ICT competences that enable them to use and develop new technologies (Arkhipova, 2024). The second direction underscores that MAs "*require no more than a high-level understanding of digital technologies and a working knowledge of new software and instruments. They do not need to develop solid technical expertise to be effective in their work.*" (Arkhipova, 2024). Technology evolution seems to have a great impact in the MA profession which calls for adaptation in the profession. BPP (2022) draws a clear view on how the accounting profession is changing from its traditional role toward a more business partnering role.

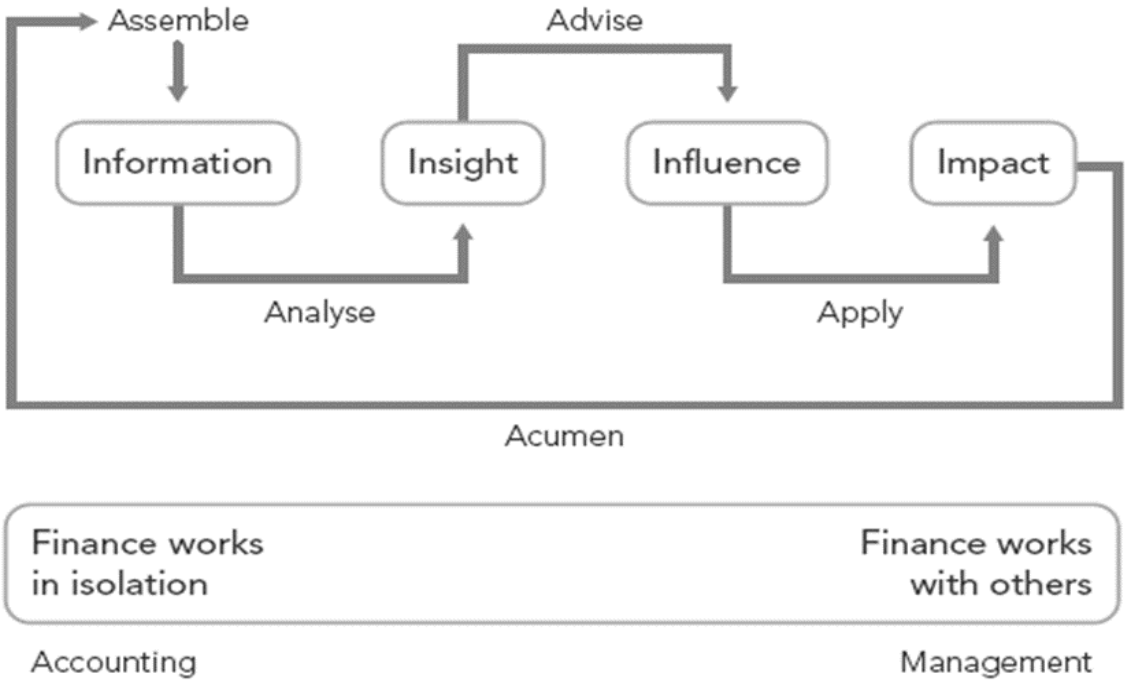

Figure 2: Information to Impact Diagram
(BPP, 2022)

The traditional role of finance professionals focused only on assembling information and analysing it to draw insights which allowed them to work in isolation (BPP, 2022). Currently, the role of finance professionals has shifted towards working with others which enables them to give advice to influence and apply for impact (BPP, 2022). This is achieved through allowing

technology and automation to assemble and analyse information, allowing finance professionals to focus on more value-adding activities such as advising and applying (BPP., 2022). Because of these changes, especially the introduction of “Big Data” in the MA profession, forces MA to learn new skills of handling data to enhance efficiency. Arkhipova (2024) emphasises three challenges posed by unstructured data for MA tasks; first, the availability, variety and exponential expansion of data raises the question of data quality. Secondly, reluctance among MAs to consider BD as a valuable resource. Managing unstructured data necessitates the adoption of new skills to enable MAs to proficiently select, collect, filter, aggregate and systematically analyse such data (Arkhipova, 2024). Thirdly, it is the fact that BD is not self-explanatory. It is noted by Arkhipova (2024) that data analytical technologies do not constitute knowledge, MAs may need to evolve and update their skill sets to cater for BD. Furthermore, many authors support Arkhipova’s (2024) paper that emphasised the need for MAs to understand BD aspects such as s data structures, data accuracy, data management, data security and data cleansing, programming, and statistical knowledge.

Arkhipova (2024) underscores in table form key competences MAs need to transition from structured to unstructured data. This transition allowed the MA profession to move from the traditional descriptive and diagnostic analysis to predictive analysis and prescriptive analysis (Arkhipova, 2024).

Context	Management accounting tasks and techniques	Management accountants competences
• Human- and machine-generated data availability from internal and external sources • Managerial insight is retrieved from analyzing data that was not initially collected for business purposes • Continuous, real-time data generation and delivery at a low cost	• Performance management and control: use of unstructured data (social media, satellite imagery, audio, video and online activity) to design new metrics and KPIs • Balanced scorecard: use of unstructured data to gain customer insight in real-time, track internal (in)efficiencies and understand their causes • Forecasting and budgeting: more accurate and impartial budgeting processes, eliminating biased budget estimates and real-time “nowcasting”	• Data quality control: MAs can contribute by assessing the risks of poor data quality and costs for the company; manual data quality control is unfeasible in unstructured, large-scale data collection; data quality control needs to be performed automatically or by a different organizational function • Perception of data value: MAs still perceive data as a burden as it interferes with their daily activities and deadlines, and lack of ownership over external data creates additional risks to privacy, reputation, interoperability • Advanced analytical skills: data-related IT skills, programming, advanced math and statistical analysis; high-level understanding of technology implications for management accounting tasks and techniques

Figure 3: Human vs algorithm-driven decision-making (Arkhipova, 2024)

These technologies affect the responsibilities, positions, and professional identities of MAs within an organisation (Arkhipova, 2024). This calls for a change in organisational roles, positioning, experts, and expertise. Tiron-Tudor & Deliu (2021) emphasised the need for MAs to acquire new knowledge in technical and programming to enable the transition from working with structured data towards working with unstructured data. Algorithms are capable of automating routine and complex tasks, but there are limitations that require human involvement. MAs may support algorithms by providing the competences outlined in Figure 1.3 such as data quality control, perception of data value, and advanced analytical skills (Arkhipova, 2024). These will enable an effective decision-making process which will generate insights to management.

2.8 Chapter summary

This chapter discussed technology acceptance model as the theoretical framework of the study. It further looked at the existing literature around the evolution of the MA profession and the importance of managing risks posed by emerging technologies. it then discussed the technologies that have a potential to significantly disrupt industries as well, management accounting profession. These technologies include big data, artificial intelligence, cloud computing, and blockchain. Lastly, the chapter discussed emerging competencies that will separate tradition “bean counters” from strategic thinkers. It is evident that the profession is changing and is waiting for no one, therefore, it is vital to stay abreast of technology to remain relevant and competitive.

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CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In the previous section (Chapter Two), the research literature relating to the researched phenomenon was outlined. In pursuit of understanding MA professionals' perceptions on disruptive technologies and emerging competencies it was necessary to employ methodical and structured approaches to give direction to the study. To accomplish this, the research methodology chapter delves into the philosophical underpinnings that guide this study, highlights the research approach used, specifies the research design, explains the choice of data collection techniques, and outlines the principles guiding data analysis. The techniques used align with the study objectives and questions. Kothari (2004) describes research methodology as a systematic way that provide solutions to the research problem. Taking it further, Kothari (2004), explains that research methodology includes various steps adopted by the researcher in studying the problem along with the logic behind them.

The selection of research methodology is important to the study's overall success since it influences the accuracy and reliability of the conclusions drawn in this study. As a result, this chapter clarifies the justifications for selecting the research methodology and discusses how well they work to answer the research questions. It will further elucidate the ethical principles guiding the study process and the measures taken to minimise any biases or breach of confidentiality.

The adopted research methodology aims to provide a clear and comprehensive insight into the research objectives and to provide answers to research questions.

3.2 Research paradigm

The research paradigm is a term that was introduced by Kuhn in 1970, as a framework for scientific practice shared and accepted by a community of researcher (Anand et al, 2022). A paradigm refers to framework for underlying presumptions or convictions about fundamental aspects of reality that shapes a specific worldview (Anand et al, 2022). According to Guba and Lincoln (1994), a paradigm represents a specific perspective that defines how one understands the world. Therefore, the main objective of a paradigm is to address three fundamental questions, being, what the nature of reality is (Ontology), what the relationship

between reality and inquirers is (Epistemology), and what is known about the reality (Methodology) (Bryman et al., 2014; Liu, 2022).

Philosophically, the researcher adopted epistemological principles, which is concerned about discovering laws with regards to human behaviour (Tuli, 2010). According to Bryman et al., (2014), epistemology is concerned with what constitute an acceptable knowledge in a study field. Epistemological stance aligns with the objectives of the study (see Chapter One), which is to investigate the level of knowledge, attitudes, and practices with regards to disruptive technologies and emerging competencies in the MA profession. To achieve the objectives the study employed an interpretivist epistemological stance. Interpretivism stance is a philosophy associated with the view of phenomenology (Bahari, 2010). Interpretivists believe that facts and values are interconnected, and research findings are shaped by the researcher's perspective and values (Bahari, 2010). Interpretivism focuses more on analysing in-depth variables and elements related to context, emphasising that humans are different from physical phenomena (Husam, 2020). It assumes that humans construct deeper meanings and cannot be studies in a similar way to physical phenomena (Husam, 2020). Interpretivism analyses variables, such as, culture, circumstances, as well as times, which lead to the emergence of different social realities (Husam, 2020). Interpretivism emphasises the importance of considering people's interpretations and perceptions of the world as a starting point in understanding social phenomena (Bryman et al., 2014).

These yielded in-depth insights in the data collected and led to high level validity as data was based on personal contributions, considering different variables. The epistemology was deemed suitable for the study as the researcher was concerned about discovering human knowledge and laws of human behaviour with respect to disruptive technologies and emerging competencies. The epistemology was also in line with the KAP study that was adopted by the researcher to formulate research objectives. The adoption of an Interpretivism stance enhanced the robustness of the research findings and enabled a more holistic understanding of MA professionals' perception of disruptive technologies and emerging competencies. The research approach adopted that aligns with the paradigm is discussed in the following section.

3.3 Research approach

Consistent with the research paradigm, the researcher adopted a mixed (Triangulation) research approach, a combination of qualitative and quantitative. Arguments on the single use of qualitative or quantitative approach have led to the emergence of mixed approach, which combines both approaches. According to Creswell (2016), mixed research method is the process whereby researchers use a combination of qualitative and quantitative techniques to

gather and analyse data. The combination of the qualitative and quantitative helps the researcher to make use of each method's advantages while minimising its drawbacks (Bryman et al, 2014). Qualitative approach focuses on understanding the meaning and experience of individuals or groups, exploring complex and subjective phenomena, and generating rich, descriptive data (Creswell, 2009). On the other hand, the quantitative approach focuses on collecting or measuring and analysing numbers, using statistical methods to the hypotheses and generalising findings to a larger population (Creswell, 2009 & Bryman et al, 2014). Creswell (2009) asserts that triangulation can be useful in establishing new measurement instruments, generating and testing theories, comprehending patterns and personal viewpoints in greater detail, and describing the relationship between variables and their linkage functions.

This study adopted the mixed method approach to have a multifaceted view of emerging technologies and competencies that are affecting MA professionals. The intent of gathering both qualitative and quantitative data simultaneously and integrating the data is to best understand the research problem (Creswell, 2004; Taherdoost, 2022). Creswell (2009) and Dawadi (2021) highlights strategies of conducting a mixed approach study, namely, **Sequential mixed approach:** With this strategy, the researcher seeks to elaborate or expand on the finding of one method through the application of another method. To generalise findings to a population, the researcher may conduct qualitative interviews as an exploratory step before moving on to a quantitative survey method with a big sample size. Alternatively, the researcher may begin with a quantitative technique that tests a hypothesis or notion, followed by a qualitative strategy that requires in-depth investigation of a small number of situations or people. (Creswell, 2009) (Johnson, 2007). **Concurrent mixed method:** The study adopted the concurrent mixed approach in data collection. It was deemed suitable because of the time constraints and limited resources. According to Creswell (2009) and Dawadi (2021), the researcher collects both the qualitative and quantitative data simultaneously and then combines the information in the interpretation of the overall results. As stated in the problem statement, MA professionals have been perceived to be static when it comes to changes in the business environment. The researcher utilised both approaches concurrently to get a multifaceted understanding of the perception of MA professionals of disruptive technologies and emerging competencies. The research design that the researcher deemed suitable and would help achieve the objectives is discussed in the section.

3.4 Research design

Cross-sectional research design was adopted as a strategy for data collection to ensure that the research problem is thoroughly investigated. Cross-sectional studies are widely conducted in the health science field to examine the widespread of disease, attitudes and knowledge among patients and health personnel (Kesmodel, 2018). According to Kesmodel (2018), cross-sectional studies are defined by the collection of data at a single point in time. Spector (2019) asserts that the nature of causal influence from a philosophy of science perspective is used to show how studies that collect data from different points in time can provide clues about connections between variables. Cross-sectional was considered appropriate for this study as the researcher aims to evaluate the level of knowledge, attitudes, and practices about disruptive technologies in the MA profession at a specific point in time, this is because the velocity of technological innovation is rapid. Al-Ababneh (2020), emphasised that cross-sectional data is collected at a single point in time as the phenomenon being studied is on-going.

The study's main objective was to gather information about independent variables (disruptive technologies and emerging competencies) and dependent variables (MAPs perception). To effectively describe the research problem, the study employed descriptive and explanatory procedures. The essential component of descriptive reporting is a clear, specific, and measurable definition or condition of a phenomenon being investigated (Grimes & Schulz, 2002; Priya, 2021). The fundamental element in an explanatory procedure are requirements and the components and their embodied relationships that explain the solution to the problem being studied (Baskerville, 2010; Priya, 2021). The researcher collected both qualitative and quantitative data in the form of semi-structured questionnaires and interviews to effectively describe MA professionals' view of disruptive technologies and explain how the emerging technologies are changing the way they perform their responsibilities. Furthermore, to gain an in-depth understanding of the phenomena being studied by taking advantage of both qualitative and quantitative procedures.

3.5 Population and sampling of the study

3.5.1 Population

Population is the total of all the objects, subjects or members that conform to a set of specifications from whom the researcher wants to draw conclusions (Benjeh & Jaradat, 2018; Pandey & Pandey, 2021). Consequently, the population for this study included accounting professionals who were the subjects from whom the researcher wanted to gather information

about the research phenomenon. These are those employees who occupy the MA and managerial accounting spaces in various organisations. Through the accounting firms and CIMA, the researcher managed to identify individuals who share the same characteristics and to develop a sample for this particular study.

3.5.2 Sampling

A sample design refers to the plan for collecting a sample from a given population (Turner, 2020). This involves the techniques or procedures the researcher uses to select items from the sample (Kothari, 2004). Sample design may include sample size, which is the number of items selected from the population to represent the population (Kothari, 2004; Acharya et al, 2013; Hennink & Kaiser, 2022). The sample of the study should neither be excessively vast nor too small, but rather optimal in size (Kothari, 2004). It must meet the criteria of efficiency, representativity, reliability, and flexibility (Kothari, 2004). There are two types of sampling, probability, and non-probability sampling.

The probability sampling often known as random sampling, is a method that ensures that each item in the population has an equal chance of being chosen (Acharya et al, 2013; Bryman et al, 2014; Creswell, 2016). Probability sampling has various methods which include simple random sample, systematic sampling, stratified random sampling, and multi-stage cluster sampling (Bryman et al, 2014; Creswell, 2016). According to Acharya et al (2013) probability sampling allows the researcher to generalise the sample's findings to the entire research population. Non-probability sampling, on the other hand, is a process that provides no basis for any view of likelihood that items in the population will have a chance to be included in the research sample (Bryman et al, 2014; Creswell, 2016). There are various types of non-probability sampling methods which include convenience sampling, purposive sampling, quota sampling, snowball sampling (Acharya et al, 2013; Bryman et al, 2014; Creswell, 2016). Non-probability sampling is convenient where the entire population is unknown. In this study the total number of MA professionals was unknown, therefore, the researcher employed a purposive sampling technique due to the unavailability of information regarding the complete scope of the study's population.

Purposive sampling is based on the subjective judgement of the researcher to select the most suitable population with the same characteristics (Tansey, 2007; Acharya et al, 2013). In this study the researcher purposely selected MA professionals in various companies who share the same characteristics. A sample of 125 respondents was meticulously selected, consisting of 12 interviewees and 113 questionnaires. However, due to constraints beyond the researcher’s capacity, including financial limitations and the restrictive nature of the profession

and its ethical protocols, only 72 questionnaires were completed, and 5 semi-structured interviews were conducted. Interviews were carried out with senior MA professionals, while questionnaires were distributed to MA professionals at various tiers of the management hierarchy. Given constraints in terms of both time and resources, the chosen sample size was deemed suitable, given the ease of data collection and analysis within the context of a smaller dataset. In the following paragraphs the study discusses the instruments the researcher employed to collect data.

3.6 Data collection instruments/fieldwork

The research aimed to address the research questions posed in Chapter One by employing a mixed-method approach for data collection. To tackle the quantitative aspect, closed-ended and open-ended questionnaires were electronically distributed to MA professionals through their mailboxes. Although this provided valuable insights, it fell short of providing comprehensive conclusions. To overcome this, the researcher proactively identified MA professionals on LinkedIn and sought their participation. Once consent was secured, participants were directed to a Google Forms questionnaire, allowing efficient monitoring of responses. The open-ended nature of the questions provided a more in-depth understanding of the perceptions, attitudes, and knowledge within the MA profession.

In contrast, qualitative data collection involved conducting one-on-one Teams interviews with senior MA professionals in selected companies. To ensure preparedness, interview questions were shared beforehand, along with a request for permission to record and transcribe the interviews. This approach aimed to capture the participants' detailed perceptions about disruptive technologies and emerging competencies in the MA profession. Interviews were chosen for their capacity to yield richer, more in-depth data compared to surveys, enabling a deeper exploration of participants' perspectives and experiences (Paradis, 2016). Paradis et al (2016), emphasises the importance of data collection; the researcher's methodology and analytical approach determine how information is collected and what explanations might be generated. Data coding and analysis are elucidated and discussed in the below paragraphs.

3.7 Data coding and analysis.

Creswell (2016), describes coding as a rigorous examination recorded data, segmenting it into significant analytical units, line by line, and dividing it into meaningful analytical segments. The coding process involves marking the segments of data with symbols, descriptive words, or unique identifying names (Creswell, 2016). This allows researchers to quickly gather and

retrieve all the text and other data linked to a specific theme, enabling them to examine unique themes together, and different cases compared in that respect (Creswell, 2016). The researcher collected both qualitative and quantitative data and analysed them using viable statistical analysis and thematic analysis.

Quantitative data analysis was

completed using a statistical package for the social sciences (SPSS) version 26.0. Quantitative data analysis's initial step was validating the data collected to ensure that it met pre-set standards. The data was then edited to reduce errors and ensure accuracy. Data editing helps in ensuring that data is analysed without problems. The next phase was coding the data.

Data coding was important to ensuring that data collected could be grouped and assigned values. Quantitative data was then analysed using descriptive statistics. Descriptive statistics helped in determining frequency, central tendency, data position, and dispersion. The data was exported from Google Forms to Microsoft Excel, before being imported to SPSS for coding and analysis. The descriptive statistics, in table form, were produced from SPSS data. The tables were used to explain and discuss the findings.

Qualitative data analysis was done using thematic analysis. Vaismoradi (2013) and Bryman et al (2014), describe thematic analysis as an independent qualitative descriptive method used analyse and report themes across a data set. Bryman et al (2014), describes it as a flexible approach that is not tied to any specific philosophical viewpoint. The interpretation of thematic analysis varies; some view a "theme" as equivalent to a code, while others see it as something that emerges from the combination of various codes. (Bryman et al, 2014). Joffe and Yardley (2004), state that a 'theme" represents a specific pattern found in the data that is of interest to the researcher. Another distinction in terms of what creates a theme or coding category is that the data is drawn from existing theoretical conceptions that the researcher brings to the data (deductive coding) or from raw information (inductive coding) (Joffe & Yardley, 2004). Thematic analysis is a method used to examine categories and present themes or patterns that relate to the data (Ibrahim, 2012). The below model shows the thematic analysis steps by Braun and Clarke in (Howitt & Cramer, 2011).

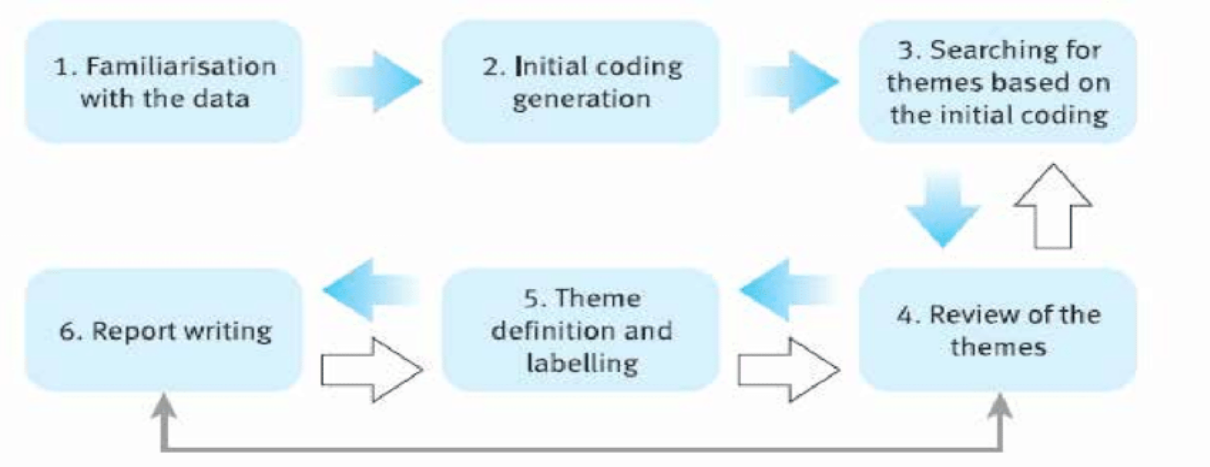

Figure 4: Thematic analysis steps
(Howitt & Cramer, 2011)

The familiarisation with data stage requires the researcher to thoroughly engage with their data by reading and re-reading and listening to the interview recording numerous times to get a sense of its entireness (Braun & Clarke, 2006). When the researcher was familiar with the data moved to the initial coding generation stage, this involved generating codes for interesting aspects of the data that align with the research questions (Braun & Clarke, 2006). In the third stage, the researcher searches for themes using generated codes to identify similarities in the data (Braun & Clarke, 2006). After all the codes and themes were identified, the researcher considered whether the themes presented a clear and persuasive narrative of the data, and began to explain in-depth the nature of each theme, and the relationship between them (Braun & Clarke, 2006). The definition and labelling step required the researcher to perform a thorough analysis of each theme, identifying the importance of each theme and devising informative names for each theme (Braun & Clarke, 2006). The final step is the actual analysis process.

3.8 Research limitations

According to Theofanidis and Fountouki (2018), limitations concern potential drawbacks that are usually beyond the researcher's control, that arise due to various factors. Limitation may affect overall study's results and conclusions; therefore, they should be stated in the paper (Theofanidis & Fountouki, 2018). The limitations unaccounted for by the researcher was lack of interest in participation by companies and management accountants. Furthermore, there was a low return of questionnaires, and some participants did not appear for scheduled interviews.

3.9 Ethical consideration

Ethical consideration is a way of conducting research in an acceptable manner which does not seek to discriminate against other people's rights (Merten & Ginsberg, 2009). The researcher had requested permission to conduct the research with all participants. Letters of approval were obtained from all parties and respondents involved in this study and an ethical clearance certificate (2022_FBMSREC 036) was received from the Cape Peninsula University of Technology's ethics committee using university ethical clearance guidelines (see Appendix A). The departure point to implement this was to explain the aim and objectives of the study to the respondents. Then it was explained to them that this study is purely for academic purposes and the final product will be the property of Cape Peninsula University of Technology.

Participation was on a voluntary basis, there was no payment nor any form of remuneration to participate in this study. It was explained to the participants that their identities would be kept private and will remain confidential. Participants were informed that they had a right to withdraw or to refuse to reply to any questions they felt were inappropriate for them to respond to.

3.10 Chapter summary

The study aimed to elucidate the research paradigm and design employed by the study to achieve the objectives stated in Chapter one. Epistemology research paradigm was adopted to gain a deeper understanding of the knowledge gap with regards to disruptive technologies in the MA profession. It was explained why the researcher employed a mixed method research approach and why data was collected using semi-structured questionnaires and interviews. In the next section (Chapter Four), the study focused on the analysis of both the quantitative (Section A) and qualitative (Section B) data and discussed the findings.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION OF RESULTS

4.1 Introduction

In Chapter Three the researcher described the methodological approach used for data collection in investigating the perception of MAs of disruptive technologies and emerging competencies in various companies. The literature reviewed in this study revealed that the role of MAs is changing from number crunching towards business partnering, resulting in the redefinition of the profession by leading MA professional bodies, such as the IMA and CIMA. The study's AIM was to investigate MA professionals' perceptions of disruptive technologies and emerging competencies. To also identify the emerging competencies in the MA profession.

To achieve the aims and objectives of this study, the researcher assumed a quantitative and qualitative research approach (Mixed-Method) to gather the required information from the participants. This chapter offers a comprehensive debate about the research findings obtained from the semi-structured questionnaires and interviews conducted with MAs. To identify, analyse and provide a clear picture of the observed patterns emerging from the data, the SPSS and thematic analysis of the findings was completed.

The analysis and findings of the study is divided into two sections. Section A presents the analysis and discussions from questionnaires, while Section B presents the analysis and discussions from interviews. Section A focuses on analysis from a sample of 72 respondents who are management accountants from different companies. Quantitative data was analysed using SPSS, and the results are interpreted in this chapter. Section B of this chapter is an analysis of five interviews with senior management accountants. So, the first part (Section A) of this chapter will focus on the analysis of quantitative data and the second part (Section B) will focus on qualitative data analysis.

SECTION A - QUANTITATIVE ANALYSIS

4.2 Quantitative analysis

Quantitative method involves the collection of numbers to discover correlation between variables within the research population (Mohajan, 2020). Quantitative data was collected to answer the research questions in Chapter One. In this study, quantitative data was collected using Google Forms, and the responses were exported into Microsoft Excel. This was done to clean the data by deleting irrelevant data to the study. In this study SPSS latest version was adopted as an analysis tool, where the researcher used codes for each question on the questionnaire. The coding was manually done by the researcher, thereafter frequencies were run for analysis. The following tables outline the responses from respondents in percentages (%), which helped the researcher to easily analyse the data.

Table 4. 1 Academic qualification of the participants

Education	Frequency	Percent	Valid Percent	Cumulative Percent
Diploma	6	8.0	9.0	9.0
Degree	48	67.0	73.0	82.0
Masters	4	6.0	6.0	88.0
Honours	8	11.0	12.0	100.0
Sub Total	66	92.0	100.0	
Missing	6	8.0		
Grand Total	72	100		
Post Graduate Education				
Postgrad Diploma – CTA	4	5.0	5.0	97.0
Postgraduate Diploma	2	3.0	3.0	100.0
Total	72	100.0	100.0	

The objective of the question was to understand educational qualifications that are required for a career in MA. The respondents were asked to name the academic qualification they

possess. The results in Table 4.1 indicate that 67%, which is the majority, possessed a bachelor's degree, while only 6% had successfully completed a master's degree. Furthermore, the 5% and 3% respondents on the post-graduate education table specified that they possessed a Postgraduate Diploma-CTA and Postgraduate Diploma respectively. It is clear from the results that academic qualification is required for one to become a management accountant.

The results underscore the importance of a higher education qualification, with all 72 participants possessing a tertiary-level qualification. Consequently, it is evident that aspiring management accountants must acquire a higher education qualification to meet the industry's demands. According to Howcroft (2017) and Kroon et al (2021) the role of higher education is to ensure that graduates possess the necessary knowledge/skills that meet the requirements of the industry. The failure of higher education in producing graduates that are industry ready and meet employers' expectations may result in a fall in demand for university graduates (Howcroft, 2017).

Table 4. 2 Do you have any professional qualifications?

Education	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	48	67.0	67.0	67.0
No	24	33.0	33.0	100.0
Total	72	100.0	100.0	

The objective of this inquiry was to ascertain whether the participants in the study were affiliated with any professional accounting bodies. This determination was crucial, as accountants registered with such boards typically possess specialised areas of expertise. Consequently, participants were queried regarding their professional qualifications. The findings in Table 4.2 indicate that 67% of the participants held a professional qualification, whereas 33% did not. These results suggest that possessing a professional qualification is likely a significant factor within the MA profession. IFAC (2007) underscores that professional accountancy bodies play a crucial role in the regulation of the profession by ensuring that the services provided by their members are of high-quality standard. IFAC (2007) further elucidates that because these bodies work closely with markets in which their members provide services, they are quick to respond to the changes in the business environment, such as emerging skills requirements and new technologies presented in the profession.

Table 4. 3 Professional affiliation

Professional Bodies	Frequency	Percent	Valid Percent	Cumulative Percent
CIMA	26	36.0	54.0	54.0
SAICA	22	31.0	46.0	100.0
Sub Total	48	67.0	100.0	
Missing	24	33.0		
Grand Total	72	100.0		

To ascertain the professional affiliations of the participants, they were asked to select from the Chartered Institute of Management Accountants (CIMA), the South African Institute of Chartered Accountants (SAICA), and the Institute of Management Accountants (IMA). The results in Table 4.3 indicated that 36% of the respondents were affiliated with CIMA, an international body for MA professionals, while 31% were affiliated with SAICA, a prominent South African accounting organisation. These findings underscore the significance of possessing a professional qualification in the field of MA.

CIMA is one of the leading large and influential bodies of professional management accountants globally. The profession's code of ethics is to ensure that its members uphold the duty to observe the highest standards of conduct and integrity to protect the reputation of the profession (CIMA, 2020). As revealed by the results, CIMA is most influential in the MA profession with over 50% of respondents possessing the qualification. According to SAICA (2020), CA(SA) designation is one of the worlds recognised accounting professional qualifications in all industries of business and finance. SAICA’s code to all members is that they must all act in the best interest of the public and the country (SAICA, 2020). CA (SA) are regarded as strategic financial experts, which means they can smoothly adapt to changes in the environment, and can practise in diverse disciplines (2020). This is supported by the results in the table which shows that more than a half of the respondents who possess the professional qualification are registered with SAICA, and work as MAs.

Notably, none of the respondents indicated affiliation with the IMA, suggesting that this qualification was absent among the participants. Additionally, 33% of the respondents did

not select any of the provided options, which may imply either a lack of affiliation with the mentioned professional bodies or a choice not to disclose their affiliations.

Table 4. 4 Level of experience

Number of years	Frequency	Percent	Valid Percent	Cumulative Percent
Less than 2 years	10	14.0	14.0	14.0
2 to 5 years	29	40.0	40.0	54.0
6 to 10 years	18	25.0	25.0	79.0
More than 10 years	15	21.0	21.0	100.0
Total	72	100	100	

The rationale behind the inquiry was to ascertain the level of experience among participants in the accounting profession. Participants with greater experience were anticipated to offer a comprehensive understanding of the profession's evolution over recent years and to provide insights into its future trajectory. Conversely, participants with less experience were expected to share their experiences and challenges as emerging professionals in the accounting field.

The results in Table 4.4 reveal that 40% of respondents possessed between 2 and 5 years of experience as finance professionals, while 14% and 21% had either less than 2 years or more than 10 years of experience respectively. The majority of respondents, therefore, are in the early stages of their careers as management accountants. Despite their relative inexperience, these participants contributed valuable perspectives to the study, particularly regarding the accelerated pace of change within the profession. Furthermore, participants with over a decade of experience offered critical insights into the evolving role of MA.

Table 4. 5 Awareness of disruptive technologies

Education	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	46	64.0	64.0	64.0
No	26	36.0	36.0	100.0
Total	72	100.0	100.0	

The aim of the question was to gain knowledge on the awareness of participants regarding disruptive technologies. This was important as it would highlight how far the profession has come and where it is going in using technology to enhance the service that management accountants provide.

According to the results in Table 4.5, 64% of the respondents were aware of the disruptive technologies that have an impact in the MA profession, while 36% of the respondents claimed that they are not aware. It is clear from the results that most of the respondents are aware of disruptive technology, which could mean they have embraced the changes and are proactively educating themselves. This is contrary to the group that said they are not aware of disruptive technologies which could mean that they have not accepted or embraced new technologies, or they are simply not aware at all. Understanding and being aware of technologies such as BD, CC, AI, and BC enable MAs to identify opportunities and risks associated with a certain technology, and also enables them to develop necessary skills to keep up with emerging technologies (Kroon et al, 2021). This could lead to improved decision-making processes, enhance operational efficiencies, and maintain a competitive advantage (Gonçalves et al, 2022).

Table 4. 6 Familiarity of disruptive technologies

Familiarity of Disruptive Technologies	Count	Column Valid N %
Big Data	32	69.0%
Cloud Computing	26	56.0%
Artificial Intelligence	34	75.0%
BlockChain	7	15.0%

The aim of the question was to determine the level of familiarity of the respondents with disruptive technologies that are believed by Arkhipova (2024); Gonçalves et al (2022) to be the most impactful in the MA profession as discussed in Chapter Two. This was important to understand as it provided insights on the adaptability and agility of MA professionals as well as that of companies.

The results in Table 4.6 indicate that 75% and 69% of respondents are familiar with Artificial Intelligence and Big Data respectively, while 56% and 15% are familiar with Cloud Computing and Blockchain respectively. It is evident from the results that Artificial Intelligence and Big Data are technologies that management accountants are mostly familiar with. This is elaborated by Zhang et al (2020) who identified the capabilities of BD, such as improved decision-making, and the capabilities of AI, such as streamlining processes. The low percentage of familiarity of Blockchain is elaborated by IFAC (2017), who points out that many finance professionals have not heard of or appreciated Blockchain. This calls for awareness and education regarding BC capabilities in the accountancy profession. The following table looked at the level of knowledge of the participants on selected disruptive technologies. The participants were asked to select whether they were beginner, intermediate, or advanced with the selected disruptive technologies.

Table 4. 7 Level of knowledge of the selected disruptive technologies

Level of knowledge	BD %	CC %	AI %	BC %
Beginner	24.0	28.0	32.0	48.0
Intermediate	48.0	32.0	36.0	20.0
Advanced	12.0	20.0	12.0	0
Sub Total	84.0	80.0	80.0	68.0
Missing	16.0	20.0	20.0	32.0
Grand Total	100.0	100.0	100.0	100.0

The rationale for this question was to gain an understanding of the level of knowledge from participants regarding BD, CC, AI, and BC. The table demonstrates the level of knowledge of participants for all selected technologies. This question was important as it helped in determining whether MAs were evolving with time and if they are proactively seeking ways to stay updated. The results in Table 4.7 indicate that 48% of respondents were intermediate when it came to knowledge of Big Data, while 12% had advanced knowledge on Big Data. When it came to Cloud Computing, 32% had intermediate knowledge while 20% had advanced knowledge. Additionally, 36% of respondents had intermediate knowledge of Artificial Intelligence while 12% had advanced knowledge of this technology. Furthermore, looking at Blockchain, 48% had beginner knowledge while there were no participants with advanced knowledge. This clearly indicates a need for education about Blockchain in MA.

This clearly indicates that MAs are increasingly aware of Big Data and Artificial Intelligence technology, with the need for more education and awareness of Cloud Computing and Blockchain. Furthermore, it is evident that MAs are proactively educating themselves about these technologies, as demonstrated by the 48% of participants falling into the intermediate level. Notably, 16%, 20%, 20%, and 32% of participants in the BD, CC, AI, and BC groups, respectively, chose not to disclose their level of knowledge. This phenomenon may be attributed either to a lack of familiarity with the specified technologies or to a deliberate decision to refrain from participation.

Table 4. 8 Importance of the selected technologies in MA profession

Importance	BD %	CC %	AI %	BC %
Not Important	0	4.0	8.0	16.0
Important	12.0	12.0	44.0	20.0
Very important	80.0	72.0	36.0	36.0
Sub Total	92.0	88.0	88.0	72.0
Missing	8.0	12.0	12.0	28.0
Grand Total	100.0	100.0	100.0	100.0

The objective of this question was to gain knowledge about the importance of each technology in the MA profession. The researcher wanted to highlight the most important technologies that newly qualified MAs should focus on in educating themselves. This could also assist small companies in identifying training development skills they should focus on in preparing MAs for the future. The respondents were asked to scale the importance of the selected technologies in the MA profession.

The results in Table 4.8 indicate that 80% of respondents rated Big Data as a very important technology, while none of the respondents rated it as not important. It is safe to conclude that Big Data capabilities are appreciated by MAs as they can see the potential of this technology in improving efficiency. This is supported by Gartner and Hiebl (2017), who highlight the important functions of Big Data technologies such as managing large volumes of data, providing more accurate forecasts, and support in making sound decisions. Cloud Computing results indicate that 72% of respondents rated it as very important while 4% rated it as not important. The minority that rated CC as not important could be due to numerous reasons, such as lack of knowledge or the level of use in their current roles. Additionally, 44% of the respondents rated Artificial Intelligence as important while 8% rated it as not important. The results show an appreciation of what AI offers as the majority rated it as important, even though there are participants who still think it is not important. This could be due to lack of implementation or awareness of AI in their current roles. As illustrated in the table, Blockchain's familiarity is very low compared with other technologies and this is indicated by the 28% of respondents who did not rate its importance. Even so, 36% of the respondents believe that BC is very important while 16% believe it is not important.

A significant portion of participants in each group chose not to disclose the importance of various disruptive technologies. Specifically, 8% of participants in the BD group, 12% in the CC group, 12% in the AI group, and 28% in the BC group refrained from providing their perspectives. This phenomenon may be attributed to two primary factors. First, it is possible that some participants lacked sufficient knowledge about the specified technologies, which hindered their ability to assess and disclose their importance. Second, there may have been a deliberate decision by some individuals to refrain from participation in the survey, perhaps due to personal or professional reservations.

Table 4. 9 Has your firm formally implemented any of the following technologies?

Technologies Implemented	**Count**	**Column Valid N %**
Big Data	34	75.0%
Cloud Computing	41	90.0%
Artificial Intelligence	20	44.0%
Blockchain	7	15.0%

The rationale for the question was to ascertain the extent to which the selected technologies have been implemented in the companies where the respondents are employed. The findings in Table 4.9 reveal that 90% of the respondents reported that their companies have formally implemented Cloud Computing (CC). In contrast, the implementation rate for Blockchain (BC) remains significantly lower, at 15%. This is supported by the low familiarity rate of BC recorded in Table 4.6. These results underscore a notable trend: there is an increasing awareness and adoption of certain advanced technologies. Both Big Data (BD) and Cloud Computing (CC) show high implementation rates, indicating their growing prevalence and integration within organisational infrastructures.

Table 4. 10 Rate the effectiveness of the selected disruptive technologies

Importance	BD %	CC %	AI %	BC %
Not effective	8.0	4.0	20.0	24.0
Somewhat effective	20.0	8.0	28.0	20.0
Very effective	52.0	76.0	24.0	12.0
Sub Total	80.0	88.0	72.0	56.0
Missing	20.0	12.0	28.0	44.0
Grand Total	100.0	100.0	100.0	100.0

The results in Table 4.10 indicate that 52% of the respondents rated BD as very effective while 8% rated it as not effective. The high rate of effectiveness is likely influenced by its benefits to MA such as improved decision-making, enhanced insights, improved efficiency. The minority rating is probable due to several reasons and one of them could be excessive information that does not yield better decision making as supported by Gartner and Hiebl (2017). The results for CC indicate that 76% of the respondents rated it as very effective while 4% rated it as not effective. Most respondents seem satisfied and confident in the capabilities offered by CC while the minority's perception is different. This could be due to challenges encountered during the implementation stage and limitation of the technology.

The result for AI presents that 28% of the respondents rated AI as a somewhat effective technology while 20% rated it as not effective. This is clearly probable that participants are not confident with AI capabilities, which could be due to lack of knowledge, lack of familiarity, or beginner experience with this technology. Furthermore, it is likely caused by lack of understanding of what AI entails or its applications, discouraging them from embracing this technology. Lastly, the results for BC indicate that 24% of the respondents rated it as not effective while 12% rated it as effective. It seems that the participants are not confident with BC capabilities in the MA profession, shown by the low rate of effectiveness of this technology.

Finally, across all technologies there are quite a few respondents who did not provide a rating for the effectiveness of the selected technologies. This could be due to various reasons such as lack of familiarity with cloud technology or simply choosing not to express an opinion.

Table 4. 11 Awareness of emerging competencies in the MA profession

Education	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	31	43.0	43.0	43.0
No	41	57.0	57.0	100.0
Total	72	100.0	100.0	

The objective of this inquiry was to identify new skills and areas of knowledge that could enhance the performance of MA professionals. By recognising emerging competencies, individuals and organisations can remain current with market demands, adapt to changes, and ensure that professionals possess the necessary skills for their roles.

The results in Table 4.11 indicate that 43% of the respondents were aware of emerging competencies, while 57% were not. This disparity highlights a significant gap in awareness among MA professionals. The findings support the hypothesis that MA professionals are not keeping pace with evolving industry requirements (Schut, 2023), as the majority of respondents demonstrated a lack of awareness regarding emerging competencies.

Table 4. 12 List of emerging competencies

The rationale for this question was to identify emerging competencies/skills required in the current market. Participants were asked to list competencies they are aware of, then the researcher identified emerging themes from the data, and coded them based on common themes.

Emerging Competencies	Count	Column Valid N %
Data science / mining	6	20%
IT knowledge	13	42%
Power BI, Alteryx	4	13%
Critical thinking, Strategic thinking	2	6%
Data analytics	3	10%
Communication skills	1	3%
Financial Analysis	1	3%
ChatGpt	1	3%

The objective of this question was to gain understanding by identifying emerging competencies that respondents believe are required in the profession. The results in Table 4.12 indicate that several competencies are required for MAs to stay relevant, which include professionals who are tech savvy with technical and soft skills. The results indicate that 20% mentioned the importance of Data science/mining, as one of the competencies that a MA must have, while 42% mentioned IT knowledge as must-have competencies for MAs to thrive in their roles. Furthermore, 13% mentioned data analytical tools that MAs can use to analyse Big Data such as an **Alteryx** tool that helps them to analyse data and information in depth, and through the tool they encode rapidly, edit, format, and amend data to their preference to make future informed decisions. **Microsoft Power BI** allows various types of data to be analysed and presented on an interactive dashboard (BPP Learning Media, 2019). These analytical tools are under the data analytics umbrella, which is emphasised by 10% of the participants who underscore that data analytics can help MA professionals in making better decisions by

analysing financial and non-financial data to identify patterns and trends. Overall, this could help organisations improve their forecasting and budgeting processes, as well as identifying areas for cost savings and improving revenues. The 6% and 3% of participants who mentioned the importance of Critical Thinking skills and Strategic Thinking skills, also included Communication skills respectively in stating that they assisted MAs in performing their duties holistically.

According to Hadid and Al-Sayed (2021), MA professionals with emerging competencies in strategic thinking can help organisations develop and execute effective strategies. They can provide valuable insights into the financial implications of various strategic decisions, such as mergers and acquisitions, new product development, and market expansion (Hadid & Al-Sayed, 2021). Strong communication skills are essential for MA professionals to effectively communicate financial information to stakeholders, including executives, investors, and regulators (Dwaase, 2020). Emerging competencies in communication can help professionals develop compelling presentations and reports that clearly articulate financial data and analysis.

Finally, emerging competencies can help MA professionals enhance their value to organisations by providing a broader range of skills and expertise beyond traditional financial reporting and analysis. By staying abreast with emerging trends and technologies, professionals can position themselves as strategic partners and trusted advisors to senior leaders.

Table 4. 13 Suggestions on how MA professionals should embrace existing and emerging technologies to remain competitive.

The last question of the questionnaire provided suggestions from participants on how MAs can keep up with the changes in the business environment and the profession. Each participant that engaged with this question was given a code “P” and the number next to the participant represents the respondent’s number, for example, P1= participant number one.

Participants	Suggestions
P1	Adapt and implement new technologies in the workplace. Provide exposure to the population. Educate people on the benefits of emerging tech.
P2	Work with the technologies; see them as an opportunity and not a threat.
P3	Change is evitable, without it you basically fall behind in the industry. Change in technology is something that improves reporting and KPIs etc.

P4	Keep up to date with the emerging technologies by researching and reading up on it and attending any in person or live seminars that CIMA or any other professional body markets.
P5	Up skill and embrace software such as Alteryx and Power BI.
P6	Management accountants should carry a high-level skill of adaptiveness to assist with current issues impacting from all possible directions.
P7	It all begins at the curriculum at the schools and universities which enable professionals to focus on the technologies they will be using in their careers.
P8	MA professionals should constantly update themselves with the latest technology innovations, in that way one can use the latest technology with the experience gained to ensure MA is done more efficiently.
P9	Professionals should have good awareness of the cyber security practices that they need to incorporate in their day-to-day use of existing and emerging technologies. As well they need to make sure that they always comply with applicable laws and regulations, for instance the Protection of Personal Information Act (POPIA). Furthermore, the use of technologies should be based on a commitment to ethics, which will include confidentiality, among other things.
P10	Invest in technology training: MA professionals should stay up to date with the latest technologies by investing in training and professional development programmes. This will help them understand the capabilities of new technologies and how they can be applied to their work. For example, professionals can attend workshops, webinars, and conferences to learn about emerging technologies like Cloud Computing, Artificial Intelligence, and Blockchain. Adopt new technologies: Once MA professionals have learned about new technologies, they should explore ways to adopt them in their work. For example, they can use cloud-based accounting software to automate repetitive tasks like data entry, reconciliation, and reporting. They can also use Artificial Intelligence to perform predictive analytics and identify potential risks and opportunities. Use data analytics to drive decision-making: MA professionals can leverage data analytics tools to analyse large volumes of financial and non-financial data to identify patterns and trends. This can help them

	make informed decisions about resource allocation, pricing, and risk management. For example, they can use predictive analytics to forecast sales and cash flow or use customer analytics to identify profitable customer segments. Collaborate with IT professionals: MA professionals should work closely with IT professionals to ensure that the organisation's technology infrastructure supports their needs. They should collaborate with IT professionals to select and implement new technologies and ensure that they are integrated with existing systems. This will help ensure that data is accurate, secure, and accessible when needed. Stay informed about emerging technologies: MA professionals should stay informed about emerging technologies by reading industry publications, attending conferences, and following thought leaders on social media. This will help them anticipate future trends and identify opportunities to innovate. For example, they can use blockchain to create secure, transparent, and auditable financial transactions. In summary, embracing existing and emerging technologies can help MA professionals remain competitive by improving efficiency, accuracy, and decision-making. By investing in training, adopting new technologies, using data analytics, collaborating with IT professionals, and staying informed about emerging technologies, professionals can position themselves as strategic partners and trusted advisors to senior leaders. References: "The Digital Finance Imperative: Managing Risk, Opportunity, and Value in the Information Age" by AICPA and Oracle (https://www.aicpa.org/content/dam/aicpa/research/reports/downloadabledocuments/2016-digital-finance-imperative.pdf) "Digital Transformation of Accounting and Finance" by ACCA (https://www.accaglobal.com/content/dam/acca/global/PDF-technical/technology/digital-transformation-of-accounting-and-finance.pdf)
P11	I would suggest reading about it and using it in your day-to-day lives.

P12	Continuous professional development through engaging short courses on emerging technologies.
P13	To improve efficiency and reduce costs yet staying ahead and improving productivity.
P14	Incorporate AI into client/ business analysis reports.
P15	Professionals need to continue their pursuit in knowledge in these areas and where needed pertain to the necessary skills to use these tools to their full potential in your work environment.
P16	Be aware and intentionally invest in knowing about Big Data, automation, focus more on analysing data rather than compiling as this is now performed by AI technology.
P17	Always find a way to adopt to new technologies and create new ways of doing things that incorporate new technology.
P18	After reading up on the four disruptive technologies, I believe that these technological advances should be embraced. These technologies will allow accounting professionals to produce outputs with minimal human error and save time that can be allocated to other business areas.
P19	Think Outside the number crunching space.
P21	Artificial Intelligence and being a lifelong student.
P23	Data analytics and programming languages. For programming not entirely to an extent of IT professionals but a skill that is applicable and could make daily work way more efficient.
P24	Every profession needs to be adaptable, more especially our accounting one. It always needs to be ready to change.
P25	Keep learning and keep up to date with technology.
P26	There is need for MA to always up skill themselves with new trends in the ecosystem.
P27	Attend training seminars.
P28	Become familiar with new technologies; ask to attend courses to upskill yourself; be open-minded to change.
P29	By constantly upskilling - doing short courses.

This question explores various suggestions provided by participants on how MA professionals can effectively use technology to enhance their processes and stay abreast in the industry. The common theme among the suggestions is the importance of education, training, and personal development. Participants mentioned the need for professionals to continuously

update their skills and knowledge through workshops, seminars, and professional development programmes. Being aware and taking initiative in understanding the capabilities of new technologies such as Artificial Intelligence, Big Data, etc, will enable them to effectively perform their duties.

P7 stressed the importance of a curriculum that prepares the students/graduates for the workplace. The curricula at schools and universities should be built in such a way that it prepares new graduates for the industry. Primary schools and high school curricula must include technology as one of the mandatory modules to expose students to the world of technology. Universities have a duty to ensure that graduates gain the necessary skills to excel in their roles in the industry.

> *"It all begins at the curriculum at the schools and universities which enable professionals to focus on the technologies they will be using in their careers."*

P9 mentioned the importance of ethical considerations in the adoption of technology and use of technology in MA roles. Furthermore, P9 stressed the importance of cybersecurity awareness, compliance with regulations, and ethical conduct in the use of technology. This will ensure that data collected will be used for its intended purpose.

> *"Professionals should have good awareness of the cybersecurity practices that they need to incorporate in their day-to-day use of existing and emerging technologies. As well they need to make sure that they always comply with applicable laws and regulations, for instance the Protection of Personal Information Act (POPIA). Furthermore, the use of technologies should be based on a commitment to ethics, which will include confidentiality, among other things."*

In conclusion, participants emphasised the opportunities presented by integration of technology for MA professionals to enhance their practices and remain competitive. By investing in education, embracing innovation, fostering collaboration, and upholding ethical standards, professionals can position themselves as strategic partners and trusted advisors in driving organisational success. Embracing technology is not merely a choice but a necessity for those who aspire to thrive in the field of MA.

SECTION B - QUALITATIVE DATA

4.3 Qualitative data

Qualitative data is the collection of “words”, meaning it is the collection of participants' experience, perception, and behaviour regarding the phenomenon being studied (Tenny et al, 2022). Qualitative data provides an in-depth understanding of the research problem as questions are open-ended, allowing participants to fully express themselves. In this study, the qualitative data was collected through online interviews, utilising Microsoft Teams, which made it easier to transcribe the interview. After, an “open coding” was done on each interview transcript. According to Allsop et al (2022) open coding is the process of reading through the transcripts and listening to the recordings to identify codes on the respondents’ responses. In this study, Thematic Analysis was adopted to analyse qualitative data, and was done by identifying emerging themes from the codes that were recorded during the open coding stage. The emerging themes are discussed in the following paragraphs.

4.4 Profiling of participants

The study began by identifying management accountants who possessed the necessary expertise and individual traits to provide the researcher with information about the research query. As mentioned above, a thematic data analysis method was employed to effectively analyse a total of 5 semi-structured interviews that were held with the identified senior management accountants. Each participant was given a code “P” and the number next to the participant represents the respondent’s number, for example, P1= participant number one. Table 4.14 below represents the participants’ demographic profiles, including the name of the company they work for, designation, the number of years in their roles, level of education, and name of the qualification.

Table 4. 14 Participant's profile

Organisation	Designation	Years of Experience	Highest level of Qualification	Name of qualification
Barloworld Limited (P1)	Senior Management Accountant	4	Degree	Accounting and (CA)SA
South African Forestry Company (SAFCOL) (P2)	Senior Cost and Management Accountant	15	Degree	Cost and Management Accountant
Exxaro Resources (P3)	Senior Management Accountant	1	Degree	Financial Accountancy
Anglo American (P4)	Senior Management Accountant	5	Degree	Accounting
Formex Industries (P5)	Senior Management and Reporting Accountant.	1.2	Postgraduate Diploma	Accounting and (CA)SA

Table 4.14 presents a comparative analysis of the professional profiles within various organisations, detailing their designations, years of experience, and highest level of qualification attained. P1, is a Senior Management Accountant with 4 years of experience, holds a degree in accounting and is qualified as a Chartered Accountant (CA)SA. P2, a Senior Cost and Management Accountant with 15 years of experience possesses a degree in Cost and Management Accountancy. P3, a Senior Management Accountant with 1 year of experience holds a degree in Financial Accountancy. P4 employs a Senior Management Accountant with 5 years of experience and a degree in accounting. Lastly, P5 has a Senior Management and Reporting Accountant with 1.2 years of experience and a Postgraduate Diploma in Accounting, also qualified as a Chartered Accountant (CA)SA. This analysis showcases the varied backgrounds and qualifications of senior accounting professionals across different industries, providing insight into the educational requirements and experience levels prevalent in these roles. It is also important to note that all participants are qualified, four of the participants with degrees, and one with a postgraduate diploma. The fact that all participants have relevant education and experience raised some hope that the data that was gathered would be sufficient to answer the research questions.

The next section discusses the themes that emerged in response to the questions asked of participants during this research. The research themes were manually chosen due to the limited amount of data collected. The participants in the study presented their views on MA roles that are evolving, emerging technologies, and emerging competencies.

4.5 Participant's role of management accountant in their organisations

The participants were asked their roles as senior management accountants in their organisations. The questions were answered by all respondents outlining their day to day, weekly, monthly, and yearly responsibilities. Table 4.15 below shows themes highlighted by management accountants as their role in their organisations.

Table 4. 15 Management accountant's role

Respondents	Role of management accountants
P1	Be more technical Be technologically savvy Analyse and interpret financials Present monthly management accounts
P2	Prepare management accounts Prepare Budgeting information Analysis
P3	Cost analysis and reporting Forecasting Budgeting Financial project evaluation Manage stock movement
P4	Manage cost performance Budgeting Identifying/Analyse financial risks

P5	Payment's review and approval Approval of invoices Tax submission Financial analysis and reporting Applying applicable standards

The most foregrounded theme by the respondents revolves around financial analysis and reporting, which is highlighted in roles like P1, P2, P3, P4, and P5. This involves activities such as cost analysis, forecasting, budgeting, and financial project evaluation, indicating a strong focus on understanding and communicating financial information. As this theme was conveyed by all respondents, it shows how important data analysis skills are in the role of management accountants. CIMA (2019) explains financial analysis as the process of analysing financial statements and data to provide insights to the management about the financial performance and position of the organisation over a period in comparison with others. P2, P3, and P4 also mentioned budgeting as their main responsibility as senior management accountants, this suggests a crucial role in financial planning and control. Only P1 mentioned being technologically savvy as a responsibility/role, which suggests the need for awareness among management accountants considering how the roles are changing because of technology advancement.

4.6 The changing role of management accountants

The research question to the participants was about their perception of the changing role of management accountants. They were asked to evaluate how this role has evolved from when they first started until the present time. This question prompted respondents to reflect on the transformations they have observed in the responsibilities and functions of management accountants over time.

As discussed in Chapter Two, since the late 1980s the MA profession has drawn criticism for not keeping up with the changes in the business environment (Zainuddin & Sulaiman, 2016; Dahal, 2019). Additionally, traditional MA has come under fire for prioritising internal processes rather than addressing external issues (Sunarni, 2013). Based on respondents' responses P2, P3 and P5 believe that the role of the management accountant has not changed; it is just the way that they do their work that has changed. They stated that before most of the tasks were done manually but with the introduction or advancements in technology most of the tasks are

automated which gives them time to focus on more value adding activities. The participants stated the below.

> P2 - *No. The role itself has not really changed as a management accountant, but times have changed. If you are a management accountant you are still required to do management accounts for the company, budgeting, and analysis. But what has changed is the technology, disruptive technologies that are coming through, Artificial Intelligence and all those things that changed certain activities that used to take the whole day doing it. Now there is some new technology that can make this thing easy for us, so those are the changes.*

> P3 - *No, it has improved, considering how a lot of things were manually. Otherwise, accounting principles, practices, and standards are still the same but improved.*

> P5 - *No. When I first came, some of the things were done manually, they did try to make sure that we are now capitalising and using the technology to assist us in doing those things because it was taking a lot of time for us to complete some of the tasks. The tasks that were done manually are now automated, and my job is to check at the end if everything is fine. Manual processing was taking too much time, which led to incomplete tasks and late submission.*

Arguably, P1 and P4 believe that the role of a management accountant has changed. They said that the role is not just about preparing a set of financial statements and management accounts but has moved to be more of Business Partnering looking at the business's financial performance. The below are the responses of the respondents.

> P1- *Yes. It's not just about preparing a set of financial statements and management accounts. You need to have a thinking capacity with regards to technology. Be able to respond to changes and developments to technology quicker.*

> P4 – *Yes. Because we have moved from just focusing on numbers only to more of business partners. The current economic conditions are forcing us to look at our business as to where it is going and how we can improve it to be more cost efficient and seeing where areas that we've got mostly opportunities in.*

The results indicate a conflict between the MAs as some believe the role has changed, and some believe it has not changed. About 60% of the respondents believe that the role itself has not changed, whereas 40% believe it has changed. This paints a picture that the role might

not have changed, but the way tasks are performed has changed because of the advancements in technology. To respond to these changes MA professional bodies such as, IMA (2023) and CIMA (2019) have updated their competency framework to include technology as one of the competencies for management accountants to be competent in. Oesterreich and Teuteberg (2019) in Kroon (2021), predict that the traditional role of MAs will shift from information provider towards a data scientist with strong systematic and mathematical-statistical competencies. It is apparent that based on P1, P4, and Oesterreich and Teuteberg (2019) in Kroon (2021), the role of MA is changing and requires MAs to be responsive and to adapt to these changes by being abreast with what's happening technologically. And because of this I foresee the role of management accountant changing soon because of the disruptive technologies.

4.7 Participant's familiarity with disruptive technologies

The question to participants was to gauge the level of awareness in the field of the MA profession regarding new technologies. Respondents were asked to mention any technology they are aware of that could change or enhance the way MAs perform their tasks. This provided insights into whether MAs are up to date with technological advancements in their field.

Table 4. 16 Disruptive technologies

Participants	**Technologies**
P1	OneStream Software SAP Phantom
P2	ERP System
P3	Algorithms for costing and budgeting Text precision
P4	SAP
P5	Syspro accounting Software

The use of descriptive technologies in the field of MA has become increasingly widespread, as evidenced by the responses of participants P1, P2, P3, P4, and P5 in the study. This analysis aims to dissect the use of various technologies in the profession, drawing insights from the diverse range of technologies mentioned by the respondents.

P1 mentioned ONE Stream software, SAP, and Phantom as technologies they are familiar with that could have an impact in the MA profession. OneStream software is explained as "unifying corporate performance management (CPM) processes such as planning, financial close & consolidation, reporting and analytics through a single, extensible solution". It is believed to be market-leading which provides an intelligent finance platform that reduces complexity of finance operations (SAP Accounting Software, 2022). OneStream is a cloud platform that supports faster and more informed decision making (SAP Accounting Software, 2022). According to BPP (2022), Cloud Computing is defined as a consumable product instead of a purchased product. It enables systems information and software to be accessed by computers remotely as a utility through the internet (BPP, 2022). It is evident from the explanation provided by OneStream that this technology, which is a part of Cloud Computing, has a positive impact and will yield greater results in decision-making.

In continuation, P1, P2, and P4 mentioned SAP as one of the technologies that have an impact in the MA profession. SAP accounting software is defined as a "financial accounting and reporting software that records transactions, reports operating data at the end of every month or quarter, and analyses financial data" (SAP Accounting Software, 2024). SAP accounting software is part of the ERP system which integrates different business functions and data to increase efficiency and enhance flexibility (SAP Accounting Software, 2024 & Blount al et, 2016). According to Quattrone and Hopper (2006), ERP SAP's potential is to provide information in real-time to anyone with access, which leads to more informed decision making by management. One of the participants, P2, mentioned that the ERP system helps them to download Big Data in real-time, then use Excel formulas, charts, and graphs to summarise the formation and create reports quicker. These innovations enhance decision-making processes and facilitate strategic insights. Furthermore, P1 also mentioned Phantom technology, which is believed not to be in South Africa yet, for future consideration. Phantom is "a platform that integrates your existing security technologies, allowing you to automate tasks, orchestrate workflows, and support a broad range of SOC functions, including event and case management, collaboration, and reporting". This technology could help in safeguarding the confidential information by identifying threats and providing action on those threats in a quick and reasonable fashion (Diego, 2018).

Additionally, P3 highlights the usage of AlgorithBms for costing and budgeting to improve the accuracy of calculations by automatically detecting errors, sparing MAs from manually identifying discrepancies. By leveraging such technologies, MAs can focus on more value adding tasks, thereby enhancing overall efficiency and accuracy in financial management. Furthermore, P3 also mentioned a new software or system called Text precision, the respondents believed that this technology would improve their lives during the cost reallocation process as it takes up a lot of time. According to P3, text precision will identify any discrepancies during the reallocation process instead of someone having to go into each cost element. MAs will still do the journals, but text precision will identify where the errors are. Lastly, P5 highlights the usage of Syspro accounting software, which seamlessly communicates with Excel, automating spreadsheet updates for specific time frames. Because of this integration, manual data entry is no longer necessary, which minimises errors and gives MAs significant time to focus on value adding activities.

This question highlighted the necessity for MAs to continuously update their skills and adapt to evolving technologies. In an era of rapid technological advancement, professionals must proactively seek out opportunities to familiarise themselves with new tools to streamline processes for efficient execution of tasks. Soon, the demand for manual data processing experts will likely diminish, as current times require professionals who can work with machines by providing expert knowledge in presenting information and identifying opportunities to improve the performance of their companies. In the following question we looked at the implementation progress of disruptive technologies by companies that participants worked for.

4.8 Impact of emerging technologies on the MA profession

The research rationale of this study is whether emerging technologies will have a positive or negative impact on the MA profession in the future. Through the insights provided by the participants, a nuanced understanding emerges, shedding light on the multifaceted nature of this inquiry.

P1 highlights the transformative role of technology in the realm of Big Data collection. They emphasised that technology allows them to access real-time data which enables MAs to shift their focus towards strategic analysis and decision-making. This view is supported by (BPP Learning Media, 2019) who explained Big Data as an enterprise data plus new types of internal and external data which can be unstructured and vast in volume but could yield new insights into business performance, risks, and opportunities.

> *Technology is helping us get the data so that you're not so worried about completeness, but more worried about analysing the information, thinking strategically to make decisions, and being able to identify risks and potential opportunities. I think technology helps us more than it works against us. It helps us focus on the right stuff.*

According to Arkhipova (2024), data relevant for MAs comes from various sources which generate real-time data in different formats, which are not presented in a structured form. The data may include structured data, which is collected internally by organisations, and unstructured data that comes in different formats, such as, videos, audios, and texts (BPP Learning Media, 2019; Arkhipova., 2024). Cleaning and analysing this type of data may take some time, but there are data connection tools such as Microsoft Power BI and Tableau which have the capacity to connect vast data sources held in different locations and contain different types of data (BPP Learning Media, 2019). These tools are cloud based and have substantial processing power which enables them to identify patterns in data (BPP Learning Media, 2019).

This sentiment is supported by P2, who underscores the time-saving benefits of business intelligence tools in summarising reports and freeing up resources for value-added activities such as financial advice and performance analysis.

> P2 - *They have a positive impact. Because at the end of the day, as a management accountant, there are so many things that we used to do that will take us forever to finish, but if you have a business intelligence tool that can summarise reports for you quicker, it saves you time and you can focus on other value adding activities like giving financial advice and various analysis commentary to management, performance analysis, cost review, identifying financial risk and opportunities.*

P1 and P2 emphasised the positive impact of technology in enhancing the efficiency and effectiveness of MA tasks. P3 further reinforces this viewpoint by affirming the overall improvement in task execution facilitated by technology. This sentiment is echoed by P5, who specifically highlights the automation of manual tasks and the resulting time savings. Moreover, P5 provides a concrete example of how technology aids in the consolidation of financial data across multiple companies, streamlining a previously cumbersome process. However, amidst the optimism surrounding technological advancements, P4 introduced a note of caution by acknowledging both the advantages and disadvantages of technology in the MA profession. While technology has enabled MAs to focus on more value-adding tasks and adopt a broader business perspective, it has also led to workforce reduction in certain areas, as evidenced by the automation of tasks that previously required human intervention.

P4 - *The advancements in accounting systems such as SAP have enabled us to focus on more value adding tasks, because the system itself collects the data depending on the report you want, then fill the report in the system with statistics and KPI's you want to see. As management accountants, we have shifted from typical accountants who look at the numbers only but look at business overall. Technology has its advantages and disadvantages as we have seen that the job that used to require 3 people to be done, no longer needs those people because they can manage to store data itself without the need for people.*

In conclusion, the responses from the participants paint a complex picture of the impact of emerging technologies on the MA profession. While there is a wide agreement regarding the positive impact of technology in enhancing efficiency, enabling strategic analysis, and automating manual tasks, there is also recognition of potential negative impacts such as job displacement. Therefore, the future of the MA profession lies in harnessing the benefits of technology while mitigating its potential negative consequences, highlighting the importance of adaptability and continuous skill development in an increasingly technologically driven landscape.

4.9 Implementation of technologies in the companies

The rationale of this question was to gain insights into future trends and potential shifts in the MA profession. It was also vital to understand the direction in which the field is moving. The question seeks to identify whether companies are proactive in adopting new technologies or if they are lagging behind. Understanding which new technologies are being considered for implementation by companies, allowed the researcher to explore how these technologies might impact work practices, job roles, and skill requirements within the MA profession.

P1 highlighted a transition from the HFM system to ONE Stream software, indicating a shift towards more advanced and streamlined tools. P2 underscored the intention to implement a more advanced ERP system, emphasising compatibility with emerging technologies such as cell phone approvals, Artificial Intelligence, and Cloud Computing. This reflects a strategic approach towards enhancing efficiency and productivity through the integration of cutting-edge technology. P3 highlighted the exploration of text precision software and algorithms for costing and budgeting systems. The respondents also mentioned that the adoption of algorithms for costing and budgeting systems is not clear in South Africa, and therefore, they are in the process of investigating and presenting the finding to the management and trying to find other similar systems/software in South Africa. This demonstrates a proactive stance towards incorporating innovative solutions to optimise operations. P4 emphasised a holistic

approach to technological integration, with a focus on efficiency improvement across all departments within the company. P5 highlighted a culture of continuous improvement, with an emphasis on finding novel technologies to streamline tasks and cut time spent on tasks.

In conclusion, the analysis of participant responses provided a comprehensive understanding of the awareness and adoption of new technologies within the MA domain, shedding light on the evolving technological landscape and its implications for organisational practices. The responses to this question informed the researcher about areas where further investigation or research might be needed, such as, the adoption of algorithms for costing and budgeting systems in the MA profession in South Africa, and the benefits of the holistic approach to technological integration across all departments with a focus on efficiency improvement. It helped identify gaps between emerging technologies and their integration into professional practices.

4.10 What technological challenges are you currently facing as an MA?

The question seeks to understand if MAs are facing any challenges with disruptive technologies they are currently using. While participants P2, P3, P4, and P5 indicated that they have not encountered any technological challenges thus far due to the limited use of technology in their roles, they acknowledged a growing need to invest time in understanding and incorporating emerging technologies into their systems. P1, however, highlighted the challenge of adaptation and the rapid pace of technological change. P1 highlighted the process of implementing new technologies, such as the time it takes in finding the right one, getting developers to present it, then piloting it, and finally implementing it. “Then you find out there is a new one. It's hard keeping up; it seems like you just need to find one that works and go with it”.

This sentiment underscores the struggle MAs face in keeping pace with technological advancements and the imperative to find a stable solution amidst the constant influx of new options.

4.11 Do you believe that management accountants possess the necessary skills for their current roles?

P1 acknowledged the importance of training, emphasising the potential for newly qualified MAs to effectively analyse financial information and add a human touch if adequately trained, but that it is hindered by time constraints. P2 mentioned that newly qualified MAs possess the necessary skills while highlighting the importance of staying updated with technological

advancements such as Chat GPT and maintaining soft skills for effective management. P3 showed confidence in the alignment between academic education and industry requirements, particularly in cost analysis and reporting, suggesting that formal education adequately prepares MAs for their roles.

> P3. *Yes. At school you are taught, especially when you're doing management accounting the actual module, there's a lot of what is called tracking and cost analysis that you do, and I believe that a lot of the job that a management accountant does is mostly on cost analysis and cost reporting. So, I believe what we do at school prepares us for work. Yes, different companies do cost reporting in different ways, but the principle remains the same. Theory at school is the same as practical.*

P4 presented an interesting view, highlighting the need for newly qualified MAs to understand the culture of the organisation first, and putting aside the knowledge learnt from schools. This will allow them to be able to make decisions that align with the organisation's goals. This highlights the importance of a learning-oriented attitude for graduates.

> P4 - *I would say yes and no. When it comes to graduates sometimes, you need to put whatever you learnt in varsity aside and learn first about the culture of that business as each and every business has its own culture regardless of the industry. You must have an "I'm here to learn" attitude.*

P5 offered personal experience, highlighting the challenges of not having experience with accounting systems and Excel advanced skills. Through these challenges the participants highlighted the importance of personal training, studying, and accounting knowledge to succeed in an MA role. All of these answers highlight how important learning new skills and adjusting to changing circumstances can be for MAs, emphasising the importance of both formal education and continuous learning for success in the field.

4.11 What other emerging competencies and technologies would you recommend to MA professionals to remain competent in their current and future roles?

According to Hartle (1995, cited in Le Deist and Winterton, 2005), competency is the personal attribute of a person that has been demonstrated to lead to higher job performance, and includes visible competencies such as knowledge and skills, and underlying elements of competencies such as traits and motives. The participants were asked to recommend competencies for the MA profession to remain competent in their current and future roles. This

question provided valuable insights into the evolving landscape of MA. P1 highlighted the importance of honing analysis skills to extract valuable insights from automated tasks, emphasising the need to elevate the role of MAs to a strategic level. P2 mentioned an interesting view of the importance of understanding Environmental, Social, and Governance (ESG) principles for MAs to strive to bring into their role. This view is supported by Sage (2022), who emphasises the importance of ESG reporting, and how financial advisers need to understand the best practices of ESG to provide valuable information to stakeholders.

> P2 - *Big Data analytics, Environmental, Social, and Governance (ESG) and what it means for management accountants. Enhance leadership skills because as MA you are becoming more of a business partner interacting with executives.*

As mentioned by KPMG (2020), ESG factors have become more critical to the success of all businesses across all industries, influencing their impacts on the world, their contribution to society and how they conduct themselves. MeruAccounting (2024), underscores the role of accountants in sustainability measurement, firstly, by data collection and analysis, ensuring that data collected is accurate and relevant. Secondly, integration with Financial Statements, by providing an overall view of a company's performance across diverse aspects. Lastly, assurance and advisory services, which ensures that the information shared by accountants is reliable, sustaining the company's confidence in commitment to responsible practices. Additionally, by offering strategic advice on ESG initiatives. P3 underscored the necessity of staying updated with accounting standards and investing in personal development, suggesting courses in applied finance to adapt to the rise of AI. P4 emphasised the multifaceted nature of MA roles, emphasising the importance of communication, numerical proficiency, critical thinking, and collaboration skills to effectively engage with stakeholders.

Participant 5 emphasised the practical importance of mastering tools like Excel and accounting software to optimise efficiency in day-to-day tasks. Overall, the participants' responses underscore the importance of staying up to date with changes in the profession and the environment including a multifaceted skill set such as analytical, technological, communication, and collaboration skills to thrive in the rapidly evolving field of MA.

4.12 Chapter summary

This study investigated MA professionals' perceptions of disruptive technologies and emerging competencies within the field. The literature review underscored a significant transformation in the role of management accountants (MAs) from traditional number crunching to strategic business partnering, as recognised by professional bodies such as the IMA and CIMA. The

research employed a mixed-methods approach, combining quantitative data from questionnaires with qualitative insights from interviews, to comprehensively understand the evolving landscape of the profession.

The findings from the quantitative data reveal that a higher education qualification is a critical requirement for a career in MA. All participants held tertiary-level qualifications, with the majority possessing a bachelor's degree. Additionally, professional qualifications were prevalent among respondents, particularly affiliations with CIMA and SAICA, highlighting the importance of specialised expertise in the field.

Experience levels varied among participants, with a sizeable portion being in the early stages of their careers. Despite this relative inexperience, these respondents provided valuable insights into the rapid changes within the profession. Awareness and familiarity with disruptive technologies such as Artificial Intelligence (AI) and Big Data were high among participants, whereas Blockchain and Cloud Computing had lower familiarity rates. This indicates a proactive approach by MAs in educating themselves about prevalent technologies, although there remains a need for increased awareness and education, particularly regarding Blockchain.

The study also revealed varying levels of knowledge and perceived importance of these technologies. Big Data and Cloud Computing were rated highly in terms of importance and effectiveness, while AI and Blockchain were viewed with more scepticism, likely due to limited implementation and understanding. The results suggest that while MAs are generally receptive to technological advancements, there is still significant room for growth in terms of knowledge and application, especially for newer technologies like Blockchain.

The qualitative data provided deeper insights into the emerging competencies required for MAs to remain relevant. Respondents emphasised the necessity of being tech-savvy and possessing both technical and soft skills. Key competencies identified included data science, IT knowledge, and proficiency with data analysis tools such as Alteryx and Microsoft Power BI. Additionally, strategic thinking, critical thinking, and strong communication skills were highlighted as essential for effective decision-making and stakeholder engagement.

Respondents stressed the importance of continuous education and training to keep pace with technological advancements. This includes integrating technology-focused modules in educational curricula at all levels, from primary schools to universities, to better prepare graduates for the industry. Ethical considerations, particularly in cybersecurity and

compliance with regulations, were also noted as critical for the responsible use of technology in MA.

In conclusion, the integration of disruptive technologies presents significant opportunities for MAs to enhance their practices and remain competitive. By investing in education, embracing innovation, fostering collaboration, and upholding ethical standards, MAs can position themselves as strategic partners and trusted advisors in driving organisational success. Embracing these changes is not merely a choice but a necessity for those aspiring to thrive in the evolving field of MA. The following chapter focuses on the research findings, recommendations, and further research propositions.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

Despite the scrutiny that the management accounting profession has undergone with claims that the profession has lost its relevance, this study was formulated to investigate their perceptions towards disruptive technologies and emerging competencies. The previous chapter presented the findings of the study through the analysis of the data that was collected to draw relevant conclusions that answered research questions and achieved study objectives. In this chapter, we do a recap of research objectives that guided the study and discuss the findings for each objective. The chapter also provides an overview of the study, highlighting the key findings and conclusions, and offering recommendations for future research. The objectives of this study formed a guideline in the preparation of questionnaires and interview guides.

5.2 Research objectives

The study's aim was to investigate MA professionals' perceptions of disruptive technologies and emerging competencies in various companies. To also identify the emerging competencies in the MA profession. The aim was formulated to gain an understanding of the research problem discussed in Chapter One of the view that management accountants are static when it comes to adopting changes in the business environment which would lead to the profession being redundant. These changes in the business environment include technological innovations that are reshaping the profession at a greater scale than before. The most impactful technologies identified by many authors in MA include Big Data, Cloud Computing, Artificial Intelligence, and Blockchain, these are discussed in detail in Chapter Two. The research problem was investigated based on the following objectives and conclusions were drawn and discussed under the same objectives.

- To investigate the extent of the knowledge gaps in the MA profession regarding disruptive technologies in various companies.

- To examine MA professional's attitudes towards disruptive technologies in various companies.

- To explore the level of disruptive technologies implementation in various companies.

- To identify the emerging competencies for the current and future role of MA professionals.

5.3 Methodological procedures adopted

The study adopted an interpretivist epistemological paradigm, which served as the guide through the study. A mixed method approach was adopted utilising both the descriptive and explanatory cross-sectional procedures to collect and analyse data. Questionnaires and one-on-one interviews were employed to collect both quantitative and qualitative data respectively. The sample of the study was 125 management accountants in various companies, consisting of 113 questionnaires and 12 interviews. Due to constraints encountered by the researcher beyond the capacity, only 72 questionnaires were completed, and 5 interviews conducted. Then, the quantitative data was analysed using SPSS latest version, and qualitative data was analysed using Thematic Analysis Procedures.

5.4 Research findings

This section presents the main results, findings, and conclusions of the study, in accordance with the stated objectives. This is an important part of the study, as graduates, newly qualified management accountants, those already in the industry, and employers, will gain an understanding of the disruptive technologies impacting the profession. They will learn what is expected of them by the industry, how they can position themselves in an evolving landscape, the skills they need to develop to keep up with changes, and the emerging competencies required.

5.4.1 To investigate the extent of the knowledge gaps in the MA profession regarding disruptive technologies in various companies

The first objective of this study was to determine the knowledge gap in the MA profession regarding disruptive technologies within various companies. The literature has criticised the MA profession for not keeping pace with changes in the business environment (Zainuddin & Sulaiman, 2016; Dahal, 2019). This criticism has led to concerns that the failure of management accountants to embrace technological advancements may diminish their contribution to management (Wessels, 2005). One participant supported this view, noting that

they are not exposed to new technologies in their company and must seek out information independently, underscoring the importance of professional development.

Based on the findings, management accountants are still required to perform traditional accounting responsibilities such as budgeting, information collection, and forecasting, but now with the assistance of technological tools to enhance efficiency. Participants had differing views on whether the role of management accountants is changing; the majority stated that the role itself is not changing, but the methods of performing tasks have evolved. This contradicts the assertion by Zainuddin and Sulaiman (2016) that the role of management accountants is changing. However, all participants agreed that instead of solely focusing on numbers and report compilation, their role has evolved to include understanding the broader business context and implications of financial data, performance analysis, and identifying risks and opportunities for the business.

To focus on these areas, participants identified various technologies that streamline processes and enhance efficiency, allowing them to engage in more value-adding activities. These technologies include OneStream Software, SAP, Phantom, ERP systems, algorithms for costing and budgeting, text precision tools, and Syspro accounting software. Furthermore, one participant emphasised that technology enables access to real-time data, which shifts their focus towards strategic analysis and decision-making. This view is supported by Lawson (2019), who draws attention to how finance professionals' roles are evolving to encompass creating value, offering insight and foresight, and acting as strategically focused business partners.

It is evident from the findings that management accountants are aware of and knowledgeable about current developments in the business environment and the influence of technologies in their field. This awareness is due to their proactive efforts to educate themselves and embrace technological changes. These findings contradict the view of some scholars who suggest that the MA profession is static regarding changes and has consequently lost its relevance (Zainuddin & Sulaiman, 2016; Dahal, 2019).

5.4.2 To examine MA professionals’ attitudes towards disruptive technologies in various companies.

The second objective of this study was to examine MAs’ attitudes towards disruptive technologies. Based on the findings all participants demonstrated a positive attitude towards disruptive technologies highlighting the benefits it yields. One of the participants mentioned

that technology is helping them more than it works against them because they don't have to worry about completeness as it does all the work. The findings also reveal the benefits of timesaving in summarising reports by using intelligent tools, which leads to the freeing up of resources for value-adding activities. This projected a positive attitude and an acknowledgement of the capabilities of disruptive technologies. However, one of the participants highlighted the disadvantages brought by technologies, such as workforce reduction in certain areas as some of the tasks are automates that previously required human intervention. This is supported by Kostoff et al. (2004) and Gould (2017), who also emphasised that these technologies would disrupt workforce participation and the nature of expectations. Furthermore, the findings highlighted the struggle MAs face in keeping pace with technologies as they evolve every day. Suggesting that one needs to find what works best for their company and persist with it.

5.4.3 To explore the level of disruptive technologies' implementation in various companies

The third objective of this study was to explore the level of implementation of disruptive technologies in various companies. The study focused on the implementation of Big Data software, Cloud Computing, Artificial Intelligence, and Blockchain. Based on findings, most companies have implemented Big Data, Cloud Computing, and Artificial Intelligence with CC leading with 90% of respondents confirming the implementation on questionnaires. There is also a high rate of effectiveness of these technologies in the MA profession. However, there seems to be a lag when it comes to Blockchain implementation and its effectiveness in the MA profession. This is supported by IFAC (2017), who points out that many finance professionals have not heard of or appreciated Blockchain. The level of implementation of these technologies is promising in the South African context, as it was believed that SA's adoption is low compared to the rest of the world (SAIPA, 2019; Pillay et al, 2017). This was due to the connectivity and accessibility issues and skills shortage (Pillay, 2017). Even though there is a promising future for MA in SA, participants indicated that there is a limited use of technologies in their roles, acknowledging the growing need to invest time in education and the understanding of these technologies.

5.4.4 Disruptive technologies impactful to MA profession

Big Data has gained popularity in the MA profession because of its capabilities in providing large volumes of structured and unstructured data that MAs utilise to identify trends, opportunities, and risks in their specific industries to improve decision making. To analyse large volumes of data such as texts, audios, videos, and social media comments can be challenging and tedious. To gain insights from such data requires data analytical tools with capabilities to analyse any form of data, such as Power BI and Alteryx. MAs are known as information providers/strategic business partners who provide management with information to assist in decision-making to achieve business goals. Adoption of BD by MAs will assist them in providing insightful and value-adding information to the management, but they also have a duty to ensure that the data is trustworthy and accurate as well as safeguarding it to protect those to whom it belongs.

Cloud Computing is popular for its capabilities that allow users to access information and do their work anywhere remotely, this enhances access to information and improves the speed and quality of decision-making. In Chapter Two (Literature Review) we discovered that there is a cloud service that is specific for accounting services and is called Cloud Accounting. Cloud accounting refers to software developed to process financial transactions and provide management reports. Cloud accounting provides flexibility and efficiency to its users, but there are also concerns/drawbacks associated with it such as reliability, internet stability, security, and confidentiality. Based on the findings CC is one of the adopted technologies after Big Data and AI.

Artificial Intelligence has gained popularity for its capabilities of streamlining MA processes and increasing efficiency. Currently, MAs have moved to processing repetitive tasks towards more value-adding tasks. Some perceive AI as a challenge as lower-end tasks are automated leading to job losses for some, and some perceive AI as an opportunity that makes their lives easier. Technology innovations are continuously introduced forcing MAs to adapt or become redundant. There is a need for continuous professional development and life-long learning to keep up with changes.

Blockchain was invented in 2008 and has progressed at a high rate gaining popularity in the accounting industry as well for its capabilities of ensuring that the transactions recorded are unchangeable without the majority' approval. BC presents benefits such as lower transaction costs, financial benefits, security, privacy, and data ownership. Considering the low adoption rate of BC, it is evident that MAs have not explored the capabilities of this technology on a

large scale. There is a need for more literature about the benefits and capabilities of BC to improve the MA profession as some authors see potential in BC.

5.4.5 To identify the emerging competencies for the current and future role of MA professionals

The fourth objective of this study was to identify emerging competencies for the current and future role of the MA profession. This objective was formulated to assist graduates, curriculum developers in high schools and universities, and newly qualified MAs to be aware of what is expected from the MA profession by the industry. Based on the findings, the competencies identified will be split into three skill areas that are important in the success of MA professionals

Table 5. 1: Identified competencies

Technical Skills	Soft Skills	Business Skills
● Technological ● Data Analytics ● Accounting Softwares ● Mastering Excel	● Communication ● Leadership ● Flexibility	● Strategic Thinking ● Decision-making ● Understanding ESG principles ● Collaboration skills ● Critical Thinking ● Ethical Considerations

It is evident from the results that for MAs to be successful in their roles, a combination of technical skills, soft skills, and business skills is vital to be trusted advisors to the management. This can be achieved through up-skilling, reskilling, and finding new areas where their expertise can add value. When it comes to technological skills, MAs must be current with new advancements by investing in training and attending seminars and professional development programmes. By doing so, they will understand the capabilities offered by technology and how they could incorporate this into their systems. Data analytics drive decision-making as MAs can use data analysis tools to identify patterns and trends in financial and non-financial information.

Newly qualified MAs are encouraged to have a receptive mind when entering the industry to learn about the business holistically and not just be fixated on accounting knowledge learnt from university. Understanding the business will assist them in providing valuable insights and making sound decisions that will improve the financial performance and the identifying of risks for the organisation. Even so, the findings confirmed the alignment of MA education, when it comes to technical skills with what is required in their roles. Therefore, there is still a need for universities to include other skills into the curriculum to fully prepare MAs for the industry.

5.5 Recommendations

Based on the research findings, the MA profession is disrupted by technology advancements and changes in business environment. This calls for a redefinition of the profession on what it is and what is expected from it. Professional bodies have had the chaos and updated their competency frameworks including technology skills. The call now lies with universities to develop a competency-based curriculum that prepares students for the industry. Education, professional development, and personal development are the cornerstones for success of management accountants in their roles; however, company management must also come on board by evolving with time in seeking technologies that could streamline the processes and provide valuable insights in achieving the objectives of the company. As stated in the previous chapter by the majority of respondents, the role itself is not changing, but it is the processes that are changing leading to the redefinition of the profession. This part of the study presents the recommendations that the researcher believes are necessary for the success of the MA profession.

- Management accountants have a duty to prioritise professional development, especially, in financial analysis and reporting by making use of the analytical tools to provide valuable insights to the management. This could improve decision making.

- The importance of being flexible and adaptable, with emphasis on continuous learning for management accountants as the role is evolving due to technological advancements.

- MAs have a responsibility to proactively look for opportunities to learn about new tools and technologies that are useful to their jobs. This requires investing time in training programmes, attending seminars, and staying updated with industry trends.

- MAs should focus more on enhancing their skills in strategic analysis and decision making and provide relevant insights to the management. They must expand their skills beyond traditional accounting as the technology has taken over routine activities.

- Higher education Institutions must develop a competency-based curriculum that integrates technical abilities, soft skills, and business skills in MA education.
- There is a need for a broader understanding of Blockchain technology and its capabilities in the MA profession as the adoption is still very low in South Africa.

In the current fast-paced business environment, the role of MA professionals is increasingly linked to the integration of technological advancements. To remain relevant, MA professionals must not only adapt to existing technologies but also embrace new advancements.

Ethical considerations also play a significant role in the adoption of technology. One of the participants stressed the importance of cybersecurity awareness, compliance with regulations, and ethical conduct in the use of technology. By prioritising ethical principles such as confidentiality and data privacy, management accountants can build trust with stakeholders and uphold the integrity of financial reporting processes.

Participants emphasised the adopting of cloud-based accounting software, data analytics, and data visualisation tools to automate routine tasks, improve decision-making processes, and enhance overall efficiency. Adoption and implementation of these technologies will streamline processes, and reduce costs, enabling MAs to invest more time in strategic activities.

Collaboration was one of the business skills that participants emphasised that MAs must have, more especially with IT department to ensure smooth incorporation and alignment during technology implementation with organisational goals. Management accountants must proactively encourage collaboration to maximise technology infrastructure, optimise data security, and maximise the value derived from technological investments. Furthermore, an adaptive mindset is essential for navigating technological advancements successfully. Participants emphasised the need for professionals to embrace change and think innovatively. This can be achieved by keeping up with emerging technologies but also look for innovative ways to incorporate them into the existing practices. In this way, management accountants can drive innovation, create new business opportunities, and maintain a competitive advantage in the market.

5.6 RESEARCH IMPLICATIONS

5.6.1 Theoretical implications

The findings of this study present various theoretical implications for the field of MA regarding disruptive technologies. The incorporation of technologies such as big data, cloud computing, artificial intelligence, and blockchain into the MA profession calls for a change of existing theories and frameworks to reflect the changing business environment This section of the study explores the theoretical contributions and direction for future research.

Evolving competency frameworks: The findings of the study show the need to develop a competency-based frameworks that align with changes in the MA profession. The study emphasises that traditional competencies are not enough for the contemporary management accountants who must now find their way around complex technological environments. As a result, theories around MA education and professional development must broaden to include new skill sets. This includes technical skills in data analytics, AI, and cybersecurity, as well as soft skills such as strategic thinking, flexibility, and innovation. The integration of these skills into existing competence frameworks may better prepare future MA professionals for the demands laid by the industry.

The changing role of management accountants: The findings challenge the traditional view of management accountants as it was primarily focused on gathering and reporting financial data. However, the role is changing towards a more strategic business partnering function that includes performance analysis, risk management, and providing insights for decision-making. This shift requires evolution of theoretical models to reflect enhanced strategic responsibilities and the use of real-time data offered by advanced technological tools. Theories on MA practice must therefore incorporate these changes, emphasising the strategic integration of technological tools to improve business outcomes.

Attitudes towards disruptive technologies: The findings of the study reveal a positive attitude among MA professionals towards disruptive technologies, which supports the notion that proactive adoption of technology can enhance efficiency and effectiveness in the profession. However, some of the professionals have concerns regarding workforce reduction and the ongoing need to adapt to rapidly changing technologies. This dual perspective suggests that theoretical models should consider both the benefits and the challenges of technological integration. Models should explore the correlation between technology adoption

and its impact on the workforce, addressing concerns about job displacement and the need for continuous professional development.

Implementation and integration of technologies: This study revealed that the extent of technology implementation varies among companies, and that has an influence on how MAs perform their duties. Technology adoption theories in MA profession should thus be nuanced to reflect this disparity. Some of the factors influencing the adoption process includes organisational readiness, investment in technology, and the availability of training resources. Theoretical models should incorporate these factors to provide a broader understanding of how and why certain technologies are adopted in different organisational contexts.

Ethical considerations in technological adoption: Ethical regulatory compliance is one of the vital aspects of technology, and the findings of this study confirm that. Ethical considerations have emerged as an important factor in the adoption of emerging technologies. The growing emphasis on cybersecurity, data privacy, and ethical conduct in the use of technology highlights the importance of ethical principles' integration into theoretical frameworks. Management Accounting theories must thus evolve to include guidelines and standards for ethical behaviour in a technologically advanced world. This includes ensuring compliance with regulations, such as, Protection of Personal Information Act (POPIA), and maintaining the integrity and confidentiality of financial and personal data.

Finally, this study calls for theoretical redefining in MA to accommodate the rapid technological changes. Integration of new competencies, technology adoption processes, and ethical considerations, will ensure that theoretical frameworks reflect the changing landscape of the profession and provide a robust foundation for future research and practice.

5.6.2 Managerial implications

Embrace and integrate technological advancements: Management must prioritise the integration of advanced technological tools such as cloud computing, AI, and data analytics. Automating routine tasks, provides an opportunity for MAs to fucus their attention on more value-adding activities like analysing and communicating financial information to the stakeholders to improve decision-making. Implementing these technologies can streamline operations, reduce costs, and improve overall efficiency.

Professional development and continuous learning: The management has a responsibility to invest in skills development programmes to empower their employees. The programmes include training sessions, seminars, and workshops on emerging technologies. This will ensure that management accountants keep up with the pace of technology changes and

remain competitive. Furthermore, it will help them to transition from traditional roles to more strategic business partnering.

Collaboration between departments: Working closely with other departments will ensure that the information provided by MAs is a true reflection of a company's financial position. When it comes to technology implementation, effective collaboration between MA and IT departments cannot be stressed enough as it is essential for successful implementation of new technologies. Management should encourage collaborative environment where MAs work closely with IT professionals to choose, implement, and optimise technological tools. One of the participants mentioned that the collaboration between MA and IT professional will ensure that technological infrastructure supports the specific needs of the accounting function and enhances data security.

Ethical and regulatory compliance: As technology becomes more integrated into accounting practices, maintaining high ethical standards and regulatory compliance is critical. Management should ensure that MAs are very knowledgeable when it comes to cybersecurity practices and regulations such as the POPIA. Emphasising the importance of ethical conduct, confidentiality, and data privacy will help build trust with stakeholders and uphold the integrity of financial reporting processes.

Development of a competency-based curriculum: Organisations should be involved in advocating for the development of competency-based curriculum that align with industry requirements. This will help bridge the gap between academics and industry needs, ensuring that new graduates have the necessary skills to navigate the rapidly changing industry standards. The curriculum should incorporate both technical and soft skills, emphasising strategic thinking, critical analysis, and effective communication.

Adaptability and innovation: On the findings, one of the participants highlighted adaptation as a challenge due to the rapid pace of technological change. Management should instil an adaptive mindset within their accounting teams. Provide support to encourage their teams to embrace change and think innovatively to help them stay ahead of technological trends and explore new possibilities within the business. This proactive approach to change can drive innovation and maintain a competitive edge in the market.

Strategic role of management accountants: The role of MAs is shifting towards providing strategic insights and supporting management with accurate information in decision-making process. Management should leverage the analytical capabilities of MAs by involving them in

strategic planning and decision-making. In doing so, MAs can contribute to value creation, identify risks and opportunities, and support the organisation's long-term goals.

These implications underscore the importance of embracing technological advancements, fostering continuous learning, and encouraging collaboration and ethical practices within the MA profession. By addressing these areas, organisations can enhance the strategic role of MAs and ensure they remain valuable assets in a business.

5.6.3 Policy implications

Competency-based curriculum development: Higher Education institutions should develop a curriculum that integrates technology and competencies that align with industry expectations for MA professionals. The curriculum should emphasise key competencies, such as, data science, IT knowledge, and proficiency with data analysis tools, preparing students for what awaits them in the industry. This will require effective collaboration between universities and professional bodies to ensure that the curriculum is regularly updated to reflect changes in the business environment, as well as the profession itself. The competency-based curriculum strategy is supported by Alver and Alver (2023), who believe that high-quality curriculum will help accounting graduates to thrive in their roles.

Continuous professional development: According to Ciuhureanu (2022), professional accountants who lack the drive for continually learning will become irrelevant in an increasingly competitive market. Professional bodies and organisations have a responsibility to encourage continuous professional development programmes for practising MAs. These programmes should focus on technological proficiency, strategic thinking, data analytics, and soft skills to ensure that professionals remain competitive and capable of performing their duties. Additionally, employers should support their employees' lifelong learning by providing access to training resources, workshops, and seminars on emerging technologies and industry trends. This can include partnerships with educational institutions and online learning platforms.

Ethical and cybersecurity standards: There should be a strong emphasis on ethical guidelines and cybersecurity standards within the MA profession. MAs must be trained to prioritise data protection, confidentiality, and compliance with applicable regulations such as the POPIA. Additionally, organisations have a duty to conduct regular audits and compliance checks to ensure adherence to ethical standards and cybersecurity protocols. This will help build trust with stakeholders and maintain the integrity of financial reporting processes.

Research and development (R&D) support: This plays a crucial role in technology development, and therefore, the government and private sector have a responsibility to invest

in R&D to explore innovative uses of disruptive technologies in MA. This could lead to the development of new tools and methodologies that further enhance the profession.

By implementing these policy recommendations, the MA profession can better navigate the challenges posed by disruptive technologies and leverage them to drive innovation, efficiency, and strategic decision-making.

5.6.4 Implications for future research

This study provides various areas for future research. One area is the study of new technology innovations, such as, algorithms for costing and budgeting, and their impact on the MA profession. Furthermore, future research might investigate the long-term effects of disruptive technologies on job roles and career advancement within the MA profession. Another potential area of study is the development of a competency-based curriculum that is effective enough in bridging the gap between academic education and industry needs.

5.7 LIMITATIONS OF THE STUDY

5.7.1 Delimitations

Delimitations are boundaries set by the researcher and are in the researcher's control with the aim of making it possible to achieve the objectives of the study (Theofanidis & Fountouki, 2018; Jansen, 2022).

Geographical scope: The study was restricted to MA professionals' working in various companies. This was set to ensure that research objectives and questions were achieved, and findings were specifically applicable to management accountants.

Professional scope: The study examined the perceptions of MA professionals from all levels of management, whether they are professionally affiliated or not. The study excluded registered management accountants who are not in practice, as the researcher was specifically looking for those who currently work as management accountants.

Technological focus: The study focused on specific disruptive technologies that have an impact on MA professionals as identified in the literature. These include Big Data, Cloud Computing, Artificial Intelligence, and Blockchain.

By setting these delimitations, the study aimed to provide a clear and focused finding of how MA professionals perceive disruptive technologies and the necessary competencies to thrive in a rapidly evolving business environment. These boundaries ensured that the research is

feasible, relevant, and sufficiently detailed to offer meaningful insights and practical recommendations.

5.7.2 Limitations

Since the population of the study was unknown, a sample of management accountants, currently practising and in South Africa was used, even so the study seeks to generalise the findings to the whole population of management accountants in South Africa. This may limit the robustness and reliability of the findings. The other limitation that may affect the study, is the continuous development of new technologies which requires new skills and competencies that may not be included in the study, making the research findings insufficient.

5.8 CONCLUDING REMARKS

In conclusion, while disruptive technologies present both challenges and opportunities for MAs. To stay abreast in this changing environment, MAs must invest in continuous education and skill development, encouraging innovation and working closer with everyone in the organisation. This proactive approach will position MAs as strategic partners and trusted advisors, driving organisational success in the digital age. The chapter underscores that embracing these changes is not optional but a necessity for those aiming to excel in the dynamic field of management accounting.

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APPENDICES

APPENDIX A: CPUT ETHICAL CLEARANCE

Cape Peninsula University of Technology

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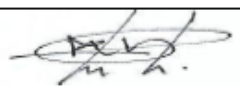
Office of the Chairperson Research Ethics Committee	**FACULTY: BUSINESS AND MANAGEMENT SCIENCES**

The Faculty's Research Ethics Committee (FREC) on **14 June 2022**, ethics **APPROVAL** was granted to **Siphokazi Ngcenge (215286472)** for a research activity at the Cape Peninsula University of Technology for **Master of Management Accounting.**

Title of project:	Management Accounting professional's perception of disruptive technologies and emerging competencies in selected accounting firms in Cape Town Supervisor (s): Prof L. Obokoh / Dr O. H. Benedict / Mrs C. Oji

Decision: APPROVED

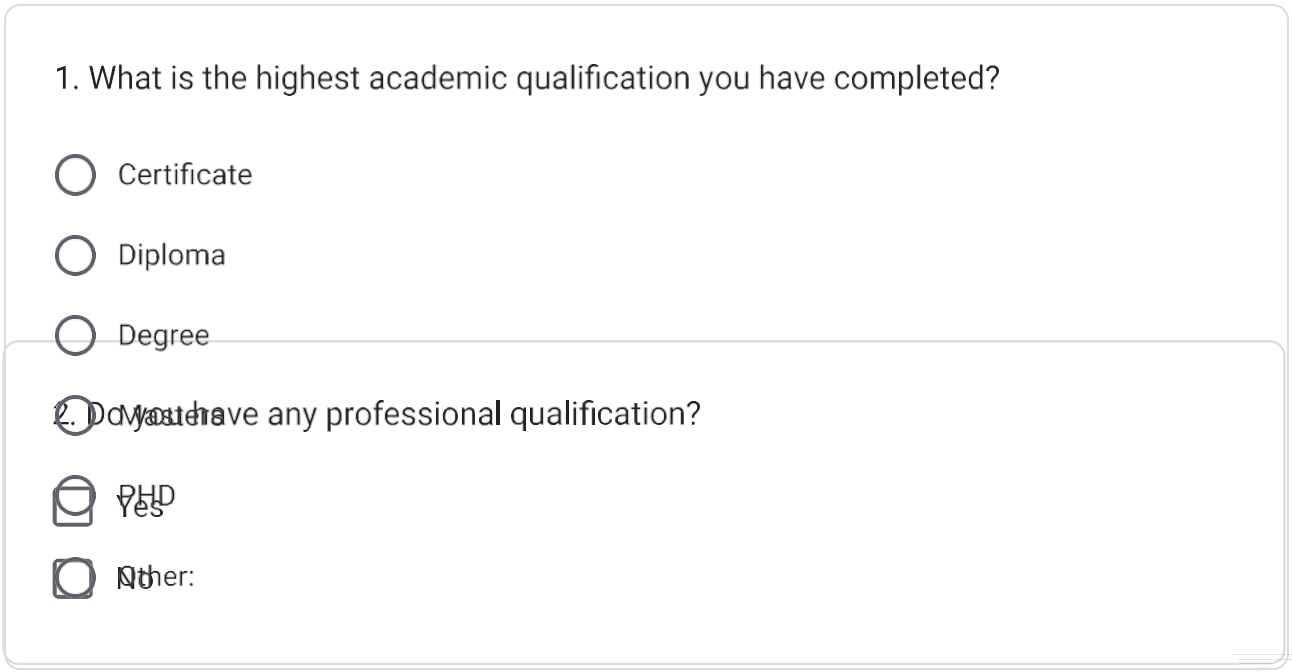
	23 July 2022
Signed: Chairperson: Research Ethics Committee	Date

Clearance Certificate No | 2022_FBMSREC 036

APPENDIX B: INTERVIEW GUIDE

Aim of the Study	To investigate management accounting (MA) professionals' perceptions of disruptive technologies and emerging competencies. To also identify the emerging competencies in the management accounting profession.
Questions:	
Closed-ended	• Name of the organisation you work for • What is your current position? • How many years of experience do you have as a management accounting professional? • What is your highest academic qualification? • Do you have a professional qualification? If yes, what is the qualification? (E.g., CA, CIMA, etc.)
Open-ended	• What is your role as a management accountant? • Do you think the role of MA professionals is changing or has changed? Why? • Are you aware of any technologies that have an impact on the MA profession? If so, which ones? • Do you think these technologies will have an impact (negative or positive) on the management accounting profession in the future? • Are you aware of any new technologies that are in your field that your company has or is planning to implement? • Are you facing any challenges with technologies? • Do you think newly qualified management accountants possess the necessary skills for their roles? • What other emerging competencies and technologies would you recommend to MA professionals to remain competent in their current and future roles?

APPENDIX C: QUESTIONNAIRE



3. If your answer is yes to question 3, please select the qualification you possess from the list below.

- ○ CIMA
- ○ IMA
- ○ SAICA
- ○ Other:

4. What is your current job title?

Your answer

5. Level of experience working as an accounting professional?

- ○ Less than 2 years
- ○ 2 to 5 years
- ○ 6 to 10 years
- ○ More than 10 years

6. Are you aware of any disruptive technologies that have an impact on the management accounting profession?

- [ ] Yes
- [ ] No

7. If the answer to the above question is "yes," please choose the disruptive technology that you are familiar with from the list below or write your response in the space provided.

- [ ] Big Data
- [ ] Cloud Computing
- [ ] Artificial Intelligence
- [ ] Blockchain
- [ ] Other:

8. Please indicate the level of knowledge of the selected disruptive technologies in question 8.

	Beginner	Intermediate	Advanced
Big Data	☐	☐	☐
Cloud Computing	☐	☐	☐
Artificial Intelligence	☐	☐	☐
Blockchain	☐	☐	☐

9. Indicate the importance of the given technologies in management accounting profession.

	Not Important	Somewhat Important	Very Important
Big Data	☐	☐	☐
Cloud Computing	☐	☐	☐
Artificial Intelligence	☐	☐	☐
Blockchain	☐	☐	☐

10. Has your firm formally implemented any of the following technologies?

	Yes	No
Big Data	☐	☐
Cloud Computing	☐	☐
Artificial Intelligence	☐	☐
Blockchain	☐	☐

11. Following your answer to the above question, please rate the effectiveness of the disruptive technologies below.

	Not effective	Somewhat effective	Very effective
Big Data	☐	☐	☐
Cloud Computing	☐	☐	☐
Artificial Intelligence	☐	☐	☐
Blockchain	☐	☐	☐

12. Are you aware of any emerging competencies that can help management accounting professionals in performing their duties?

- ○ Yes
- ○ No

13. If your answer is yes to question 13, please list the emerging competencies in the below space.

Your answer

14. Please provide suggestions on how management accounting professionals should embrace existing and emerging technologies to remain competitive.

Your answer

APPENDIX D: EDITING LETTER

Mirna Lawrence
Language editor & proofreader

DATE: 29 August 2024

I, Mirna Lawrence, hereby declare that I edited the Master's of Technology in the Faculty of Business and Management Sciences thesis of Siphokazi Ngcenge titled *Management accounting professionals' perceptions towards disruptive technologies and emerging competencies*.

The document has been edited within ethical and professional limits for syntax, grammar, spelling, punctuation, word usage, sentence structure and flow, consistency of argument, stylistic consistency, tense, consistency of voice (passive voice to active voice), sequencing of figures and tables, and referencing.

The editor's revisions, comments and suggestions and overall quality of the final product do not detract from the content being the author's sole responsibility and work in its entirety.

The language editor does not accept responsibility for any changes made to this document after the issuing of this declaration.

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