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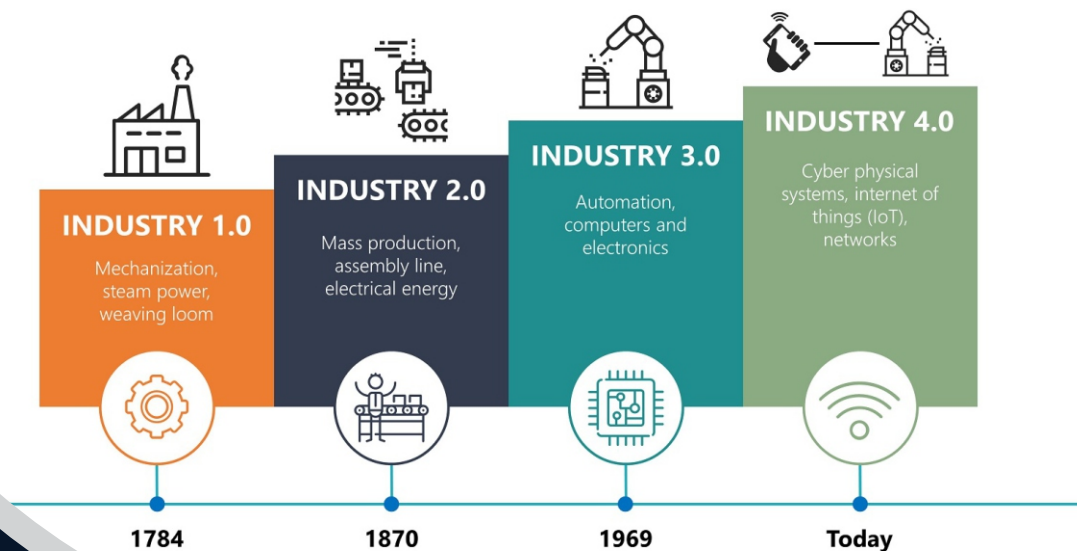
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# 4IR



## THE FOURTH INDUSTRIAL REVOLUTION

*Assessing the Readiness of Accountancy Profession in Africa*



By: Professor Obert Sifile, Dr. Daniel Twesige, Dr. Faustin Gasheja, Dr. Edson Gwangwava, Dr. Shepard Makurumidze, Dr. Kudzanai Matowanyika, Mr. Shakemore Chinofunga, Dr. Rangarirayi Mbizi and Mr. Kalisa Sunda





**Pan African Federation of Accountants (PAFA) and  
African Accounting & Finance Association (AAFA)**

# The Fourth Industrial Revolution: Assessing the Readiness of Accountancy Profession in Africa

Professor Obert Sifile

Dr. Daniel Twesige

Dr. Faustin Gasheja

Dr. Edson Gwangwava

Dr. Shepard Makurumidze

Dr. Kudzanai Matowanyika

Mr. Shakemore Chinofunga

Dr. Rangarirayi Mbizi

Mr. Kalisa Sunday

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## EXECUTIVE SUMMARY

The Fourth Industrial Revolution (4IR) is an era of technological innovations that are enhancing human-machine interfaces. Such technologies are unlocking new market opportunities and growing global economies. There have been huge leaps from Industry 1.0 to Industry 4.0 (also called 4IR), and their consequences brought about huge challenges and opportunities to accountants in Africa. This research was, therefore, motivated by the desire to assess the readiness of the accountancy profession in Africa to use 4IR technologies. The specific objectives of the study were to: establish the nature of 4IR technology, identify the skills that are required by accountants to utilise 4IR technology, determine to what extent 4IR technology is used by accountants, establish how African accountants currently utilise 4IR to contribute to SDGs and Agenda 2063, establish how 4IR has affected or will affect the work of accountants in Africa and recommend what needs to be done for African accountants to remain relevant in the 4IR era.

The target population for the study was 114,800 Professional Accountancy Organisations (PAOs) members from all 44 countries in Africa who were members of the Pan African Federation of Accountants (PAFA). The geographical spread of the 44 African countries from which the population was drawn, made online questionnaire and telephone interviews the most ideal methods of gathering data. For the questionnaire, a Google survey was sent to members who were in the database of PAFA. Emails were also sent directly to all members of PAOs in the various countries. A total of 267 responses were received out of 114,800 members representing 0.23% of the population. Forty-eight accountants were interviewed by telephone using the snowball sampling technique. Quantitative data gathered from online questionnaires was analyzed using the IBM Statistical Package for Social Sciences (SPSS) and ATLAS.ti 9 was used to analyse responses from interviews.

The study showed that accountants in Africa had heard about 4IR. On 4IR technologies that accountants had heard about, the Internet of Things (IoT) seemed the most dominant technology used and known by accountants. However, results show that in-depth knowledge of the nature of 4IR technologies was still low among the majority of respondents.

The study established that, for accountants to effectively work in 4IR, they required soft, technical and entrepreneurial skills. Although the results revealed that accountants required a variety of skills to be able to work in 4IR, they needed technical more technical than any other skills. Interviews also identified human (or soft), technical and entrepreneurial skills as core to 4IR adoption. Human skills identified were strategic, critical thinking, emotional intelligence and interpersonal capabilities while

information technology skills topped the technical skills list. The study found that accountants possessed an average level of skills to use big data analytics and block chain technologies. The results further indicate that there were low levels of skills in the usage of machine learning, robotics and artificial intelligence.

Results of the study showed that IT hardware in use was reliable although most companies were failing to outsource IT hardware infrastructure due to high costs. Most accounting systems in use had an in-house IT hardware support service. Accounting professionals were not sure whether organisations had necessary hardware to be able to use 4IR. On the types of software used by accountants, results indicated accounting, database management, intranet, statistical analysis, on-line storage and audit software. There were several least popular 4IR technologies such as big data and e-filing of taxes. The most stated benefit of 4IR technology was time effectiveness, improved communication, quality reports, accuracy, real-time processing, voluminous data processing, increased productivity, remote working and prevention of fraud. However, financial challenges were cited as a restriction affecting the ability of African accountants to adopt 4IR technologies. The financial challenges included costs of establishing and maintaining the right technology as well as training and re-training of accountants. Inadequate funding was also found to result in poor network connectivity. Other restrictions to 4IR use were lack of government support for ICT infrastructural development.

The study established that 4IR technologies improved the standard of living and reduced social marginalization. Other findings were that 4IR brought uniformity in the work of accountants in performing their duties. It was also established that ICT eased manual work, improved agricultural productivity, reduced environmental pollution, improved health services, financial inclusion and knowledge sharing. These benefits were critical for achieving SDGs and the African Agenda 2063.

The study revealed that technological innovations had greatly transformed the role of accountants, implying that respondents agreed that technological innovations had transformed the role of accountants and thus helped to improve the contribution of accountants to create value at their work places. The study showed that 4IR was creating new avenues in accounting work like new jobs, transformation of work places and handling of huge computational tasks. Results of the study also pointed at 4IR technologies that were used by the accounting professionals to improve audit quality, reduce audit risk and transform work places among others.

The study established that there was need to develop 4IR skills of accountants. This could be done if universities offered continuous professional development programs for accountants. Universities could develop curricula that incorporates 4IR concepts, thus create synergies between the accountancy and ICT professionals and providing refresher courses in relation to concepts of 4IR. The results from the survey show that accountants required development in different technological areas



to survive redundancy. The major skills areas included cloud computing, big data analytics, globalization outsourcing, tax regulations, and new forms of corporate reporting, integrated reporting and carbon emission. Other strategies were training on strategic thinking and getting internationally recognised qualifications. The most common technical skills recommended by the study included artificial intelligence, machine learning, cyber security, robotics, coding, big data analysis, cloud computing and block chain.

The study proffers several recommendations such as:

- PAOs, universities and employers should produce a digital workforce for the future by training their members on the trending technologies like block chain and robotics that reduce manual work and improve efficiency.
- PAOs, employers and universities should train accountants to acquire soft, technical, entrepreneurial and critical thinking skills as continuous professional development.
- The training of auditors should embrace the use of 4IR technologies to improve audit quality and minimise audit risk.
- African Governments should make policies that promote foreign direct investment in the field of computer, 4IR hardware and software manufacturing. That would in turn make both hardware and software affordable.
- Finally, accountants should continuously train and retrain on new and trending technologies like computerized audits, big data analytics, machine learning, artificial intelligence, robotics, bit coin and its risks in the monetary systems, cyber security in 4IR, cloud computing and information management systems.

## CHAPTER 1 - INTRODUCTION

### Introduction

The research was motivated by the desire to assess the state of readiness of the accountancy profession in Africa to use the Fourth Industrial Revolution (4IR) technologies to enhance their value creation. Technology is a moving target, thus there was the need to establish how the accountancy profession was grappling with that state of technology and the changes it brought about. While the 3<sup>rd</sup> Industrial Revolution (3IR) ushered in the use of computers, the 4IR brought with it aspects like the Internet of Things (IoT), 3D printing, robotics and Artificial Intelligence (AI). These technological innovations have repercussions and affect the work of accountants in Africa and beyond.

The accounting professional has been evolving since the discovery of the debit and credit by Luca Decapolis. However, digitalization which came along with the Fourth Industrial Revolution (4IR) has changed the ways of doing business and so as the accounting discipline (Blockgeek, 2019; Hoffman, 2017). Digitalization is affecting organisations on how they organise, process and evaluate the financial data which improves productivity and saves costs and time. In addition, it affects auditors and also helps them to uncover fraud, inconsistencies and other faults that affect organisations (Liffrey, 2018).

4IR has come with different technological innovations such as block chain - based distribution ledger, big data analytics, artificial intelligence and robotics that are likely to affect the accounting jobs (Hoffman, 2017). This type of innovation does not require intermediaries and thus this helps to minimize the costs. The block chain is changing the accounting and auditing in the world. It is creating new opportunities and challenges in accounting and auditing. This technology can be applied in property records, banking, supply chain, auditing, anti-money laundering, customer survey, stock trading, smart customers (Blockgeek, 2019). Information technology offers opportunities to accounting professionals and practitioners to explore the environment and curb the benefits related to digitalization (Liffrey, 2018). Digitalization is making machines to perform accounting tasks better and faster than the human being. This creates challenges on how the humans can be able to stay competitive and add value in the field of accounting and auditing (Blockgeek, 2019).

IFAC (2016) published a document explaining how accounting professionals could help in the realization of the Sustainable Development Goals (SDGs). The African Union Agenda 2063 is a continuation of the Sustainable Development Goals. The African Union Agenda is based on principles which include a prosperous Africa based on inclusive growth and sustainable development, integrated continent based on ideal Pan - Africanism and vision for African renaissance, an Africa of good

governance, democracy, respect of justice and rule of law, an Africa with strong cultural identity, common heritage, values and ethics, an Africa whose development is driven relying on the potential of African people especially the youth, women and caring children and Africa as a strong, united and influential global player and partner (Addaney, 2018, Ndizera and Muzee, 2018). The 4IR is changing the field of accounting (Blockgeek, 2019). Therefore, the accounting academicians, practitioners and researchers need to broaden the boundaries of the accounting discipline in order to integrate the SDGs, African Union Agenda and the 4IR.

The accounting professional is touted with many advantages which are direct and others indirect. Konan *et al.* (2021) points out that accounting plays a very important role in ensuring accountability of the society and also enhancing planning and control which major ingredients in the development of the country. Weak accounting and auditing is the main root for corruption in many African states (Lassou *et al.*, 2021 and Lassou *et al.*, 2014).

In spite of the importance of the accounting profession in ensuring development and achieving the SDGs in Africa, the accounting professional in Africa is faced with a number of challenges. Previous research by Konan *et al.* (2021), Lassou *et al.* (2021), Tawiah (2019) and Soobarayen *et al.* (2019) show that the accounting professional in Africa is faced with lack of capacity to implement accounting reforms, poor technological advancement, political and institutional interest.

There was consensus among accountants that their very existence was being threatened by technologies that surround 4IR e.g. Smart Contracts through block chain technology, Artificial Intelligence and Machine Learning (Ryan, 2019). To be able to accomplish accounting tasks, accountants had to possess both technical and social skills (Wahyuni, 2018). As automation improved, the value of traditional accounting routine functions was lowered drastically, hence the need to prepare the accountants to use the innovative technology that was already there and the evolving technology that was not in a distant future (Ryan, 2019; Akther and Sultan, 2018).

Technical skills which accountants in African required included understanding the capabilities of accounting software, analysis skills, data visualization, knowledge of international standards, knowledge of industry specific regulation, basic coding, fintech software knowledge, data security forensic tools, data warehouse management and Enterprise Resource Planning (ERP) (Nguyen *et al.*, 2020). The social skills included strong communication, conflict solving, leadership skills, risk management, strategic decision making, emotional intelligence, innovation, creativity and customer service orientation. The social skills helped in bridging the gap between the machines and humans (Marx *et al.*, 2020).

Accountants would be required to recognize the relevant information needed by managers and other stakeholders to make decisions. These tasks require strong communication skills to be able to share the information so as to facilitate the decision making (Georgieva, 2019). The future jobs of accountants would most likely be block chain accountant, healthcare accountant, cyber-crime accountant, fintech accountant, analytical guru, cloud accounting specialist, fintech city planner accountants, data security accountant, historical accounting analyst, system integrate strategic accounting analysts (Dharmadhikari, 2020). The advancement in 4IR which is ICT – driven, would have casualties among accountants yet it was also an opportunity for the accountancy profession to adapt and flourish (Dharmadhikari, 2020).

### Statement of the Problem

The adoption and use of 4IR is on the increase as evidenced by many professions grabbing the opportunities that come with the use of 4IR, such as efficient communication, storage of large volumes of data, processing of big data, and transmission of huge volumes of data to various locations, among others (Abrahamse, 2018). 4IR technologies keep on metamorphosing as evidenced by use of modern technologies (Liu and Xu, 2017). Such technological changes also require accountants to keep abreast so that they are able to use the technologies to create value at their workplaces (Georgieva, 2019). In spite of the importance of the accounting profession in ensuring development and achieving the SDGs in Africa, the accounting professional is faced with a number of challenges. Previous research by Konan *et al.* (2021), Lassou *et al.* (2021), Tawiah (2019) and Soobarayen *et al.* (2019) show that the accounting professional in Africa is faced with lack of capacity to implement accounting reforms due to poor technological advancement. Information technology offers opportunities to accounting professionals and practitioners to explore the environment and adopt the benefits related to digitalization (Liffrey, 2018). Digitalization is making machines to perform accounting tasks better and faster than human beings. This creates challenges on how the humans can be able to stay competitive and add value in the field of accounting and auditing (Blockgeek, 2019). While there are many studies on 4IR on the work of accountants, there is a dearth of similar studies and impacts on accountants in Africa and how they could adopt and adapt to the never-ending changes of 4IR.

### Research Questions

The study sought to answer the following research questions (RQs):

- RQ1      What is the nature of 4IR technology?
- RQ2      What are the required skills to utilise 4IR technology?
- RQ3      To what extent is 4IR technology in use?
- RQ4      How do African accountants currently utilise 4IR to contribute to SDGs and Agenda 2063?

- RQ5      How has or how will 4IR affect the work of accountants in Africa?
- RQ6      What needs to be done for African accountants to remain relevant in the 4IR era?

### **Setting of the Study**

The study focused on the accounting profession in Africa. As per the PAFA website in 2020, there were 55 Professional Accounting Organisations (PAOs) from 44 member countries. The registered professional accounting members as per the PAFA website (<https://pafa.org.za>) were 114,800. It is worth noting that it is not possible to establish the exact number of accountants, Some accountants do not join professional bodies, thus they are not accounted for.

There is contradicting literature on the history of accounting practice in Africa. Whereas some researchers like Rahaman (2010) have indicated that the birth of accounting in Africa dates back to the ancient time of Pharaohs of Egypt where public officials were supposed to practice accounting and accountability. Other researchers point out that the origin of accounting in Africa is linked to the colonial era (Lassou *et al.*, 2014; Elad, 2014 and Mayegle, 2014). Although the colonialists shaped the accounting practice over a long time, the evolution of international financial institutions such the World Bank, and International Monetary Fund are changing the shape of the accounting practice in Africa (Lassou *et al.*, 2021). For example, in 1993, the accounting plan that was being practiced by many Francophone countries was replaced by Organisation for the Harmonisation of Corporate Law in Africa (OHADA). This aimed at establishing a common language of accounting and to harmonise the accounting practice with international standards. Lassou *et al.* (2021) also observed that the international financial institutions are shaping the accounting practice in Africa. Tawiah (2019) and Soobarayen *et al.* (2019) show that many countries in Africa have adopted the use of IFRS in reporting although there is weak professional capacity.

### **Outline of the Study**

Chapter One provides an introduction of the study, statement of the problem and research questions. The rest of the paper is organised as follows: Chapter Two articulates the theoretical and empirical review of the study. Chapter Three outlines the research methodology used in the study. Chapter Four provides analyses of the data while Chapter Five provides a summary of findings, recommendations, limitations and areas for future research.

## CHAPTER 2 – LITERATURE REVIEW

### Introduction

This section reviews literature on 4IR with particular reference to the nature of the Fourth Industrial Revolution, skills required by accountants to utilize 4IR, how accountants are utilizing 4IR, the role of 4IR in achieving SDGs and the African Union, effects of 4IR on the work of accountants and interventions that will make African accountants relevant in the 4IR era.

### The nature of 4IR technology

The Fourth Industrial Revolution is a term which was first used by Klaus Schwab as the focal topic of the World Economic Forum (WEF) of 2016 (Keremidchiev, 2019). 4IR is associated with the beginning of the 21<sup>st</sup> Century – a century of digital technologies (Man and Man, 2019). Technology in 4IR supports smart, data driven, and global connectivity in a 21st Century mode of industrialisation agenda. These new innovations are empowering ever-more elevated levels of production efficiencies (Bai *et al.*, 2020). The metamorphosis of Industrial Revolutions is captured in Table 1 below:

Table 1: Industrial Revolution Transformation

Revolution	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
Time Period	18th and 19th centuries	Late 20th century (1970s)	1970s to 2000	2000 and beyond
Technologies	Plants were powered by Steam and Water (Abrahamse, 2018).	Mass production through electrically powered manufacturing (Abrahamse, 2018).	Electronics and information technology drove automation (Abrahamse, 2018).	Relies more on the Cyber Physical Systems (Liu and Xu (2017)

The 4IR centres on the connection of physical and cyber networks to allow actionable insights and real-time information flow (Olarewaju, 2021). The Fourth Industrial Revolution significantly integrates manufacturing processes with innovative Information Communication Technologies (ICTs) and other intelligent technologies (Wang *et al.*, 2017). These technologies can lead to smart workplaces, quality services and products and business process efficiency.

4IR comes with tools such as Artificial Intelligence (AI), big data analytics, Virtual Reality (VR), Machine Learning (ML), robotics and Cloud Computing (CC) which are now widely used in the world. This is because of the advantages of the use of electronic devices to do work that is repetitive, predictable, logical and programmable (Ryan, 2019). Herweijer *et al.* (2018) examined how the fourth industrial

revolution is offering huge opportunities to transform economies and societies. The study identified ten emerging 4IR technologies that were changing the society. These include advanced materials, cloud technology, autonomous vehicles including drones, synthetic biology, virtual and augmented reality, artificial intelligence, robots, block chain technologies, 3D printing and internet of things. Wim (2017) investigated entrepreneurship, education, and 4IR. The findings show that African entrepreneurs required governments to build a knowledge economy and internet of things that allowed people to connect.

Business needs to capitalise on the use of Internet of Things (IoT) and leverage on Industrial Process Automation. Skills sets built around Machine Learning (ML), Artificial Intelligence (AI) and Robotic Process Automations (RPA) have contributed to changes and developments in the accounting profession requiring the current and future accountants to continuously upgrade their skills to keep pace with the machine for AI and RPA processes which have low error margins (Akhter and Sultana, 2018). Accountants need to capitalise on what machines cannot do, for example, technology can hardly expedite emotional intelligence and execute critical thinking abilities inherent in a human being. The Fourth Industrial Revolution technologies could replace all repetitive low skills jobs since these can easily be automated (Goldin and Katz, 2008).

Naqvi (2020) postulates that there are two wellsprings of upper hand in the 4IR: automation and artificial intelligence. These enable the creation of new automated products and technological services. They also facilitate the development of completely novel ways of doing things, creating the digital workplaces, redesigning new technical processes, as well as developing new knowledge for the new knowledge driven society.

### **Skills required to utilize 4IR technology**

Technological progression amplifies utilisation of 4IR technologies in the auditing and accounting profession. Technology is widening the scope of the accounting profession thus knowledge of the areas that are trending in 4IR technologies together with key survival skills are required for accountants to survive the future (Akhter and Sultana, 2018). KPMG (2020) proposes the bridging of the skills set of a traditional accountant into that of a Cyber Analyst which is a comparatively easy area to capacitate. Organisations will need to create awareness in their employees of 4IR to avoid a situation as reported in Australia where 35% of accountants had never heard about 4IR (KPMG, 2020).

A study by Dahlin (2019) investigated the relationship between use of robotics and organisational skills and concluded that while 4IR is disruptive, an increase in industrial robotics is highly associated with a corresponding increase in high to middle level organisational technical skills. On a similar note, the

KPMG Report (2020) argues that 4IR is deemed to shift roles and skills due to new skills set requirements. Rapid growth of 4IR technologies such as AI and Robotics is set to significantly impact the current workforce hence the need to act on job transitions quickly to avert structural unemployment by up-skilling employees to become relevant and employed and avoid profession extinction (KPMG, 2020). Organisations need to identify the jobs and skills that have been threatened by 4IR and strategize for future employability while harnessing the value of emerging technologies.

Kruskop *et al.* (2020) did a literature review on digital accounting and the human factor in Finland. Findings showed that the future job of accountants would be using the sophisticated accounting information system. Thus, with continuous digitalisation and innovation, it is hard to predict with certainty how the field of accounting will be in 10 – 15 years to come. More importantly, unless the current education curriculums are revisited, the Fourth Industrial Revolution is likely to create a large skills gap in the accounting professionals. Adriana *et al.* (2019) carried out a descriptive research on accounting ethics education in 4IR in Indonesia. Primary and secondary data were collected from lecturers in accounting using a questionnaire, interview and document review. Results show that ethics in the teaching of accounting should be increased due to risk of fraud associated with technology. This should be done to shape the student's ethical characters.

Wahyuni (2018) examined the role of information technology in supporting accounting professionals in the era of industrial revolution in Indonesia. The study adapted a descriptive analysis and primary data were collected using a questionnaire. The findings from the survey revealed that information technology through the application of digital data technology such as the internet of things, artificial intelligence, cyber-physical systems, big data, robotics, are changing the role of accountants. Thus, accountants require new sets of relevant skills to be able to perform their duties.

### **The extent to which 4IR technology is in use**

Umeh (2010) asserts that computerization for effective and efficient financial reporting is a part of professional management. The explosion of information technology, particularly computer technology, has brought about far-reaching changes in financial reporting systems. Digitalization is affecting the ways and processes that organizations are doing business, thus it automatically affects the accounting discipline (Blockgeek, 2019). Digitalization is affecting the way institutions organise process and evaluate the financial data and this improves the productivity and reduces costs and time. In addition, it affects the auditors and also helps them to uncover fraud, inconsistencies and other faults that may affect the organization (Hoffman, 2017).

Accounting processes such as expense management, accounts receivable and payables processing are being replaced by artificial intelligences powered by invoice management and supplier boarding



(Blockgeek, 2019). The accelerated technology use as a direct result of technological progression cannot be overlooked (Akther and Sultan, 2018). However technical innovations can hardly replace critical thinking skills and emotional intelligence that are inherent in a human being (Akther and Sultan, 2018).

### **How African accountants are currently utilising 4IR to contribute to SDGs and Agenda 2063**

The role of 4IR in achieving the SDGs and African Union Agenda 2063 has attracted attention of various researchers who concur that if Africa is to grow; implementing the 4IR is not a choice but a reality (Ndizera and Muzee, 2020). Kiconco (2020) analysed the implication of big data on the role of libraries in the realization of SDGs in Uganda. Findings show that libraries contributed to improved outcomes across the SDGs by supporting the implementation, provision of information, literacy and ICT skills, designing taxonomies and community engagement.

IFAC (2016) published a document explaining how accounting professionals could help in the realization of the SDGs. The document points out eight SDGs which the accounting professionals should dwell on in trying to achieve the development goals. These include quality education, gender equality, decent work and economic growth, industry innovation and infrastructure, responsible consumption, climate change, peace, justice, strong institutions and partnership for goals. Mauliya (2017) and Firmansyah (2019) show that Indonesia professional accountants are adjusting their existing accounting standards to incorporate the SDGs. Studies in UK (Wilson, 2017) and Indonesia (Mauliya, 2017) showed that there is SDG reporting.

Pollitzer (2018) carried out a study which aimed at exploring the routes towards a more equitable digital future in Europe. The findings show that ICT created a positive social economic change in education (SDG 4) through internet, computer and ICT skills, gender (SDG 5) based on the innovation and infrastructure (SDG 9) percentage of the population covered by mobile network and technology and finally global participation (SDG 17) on fixed internet broad band and the proportion of people using internet. If African countries are to achieve the SDGs and Agenda 2063, industrialization is not a choice but a must (Herweijer *et al.*, 2018).

### **How 4IR affect the work of accountants in Africa**

There is a dearth of studies on the effects of 4IR in Africa. Many studies have been carried out in Asia and the developed world. A review by Hong and Seo (2018) concluded that 4IR pushes the need for accountants to focus on audit quality, reduce risk and promote audit innovation. These aspects are huge 4IR issues for accountants that should not be avoided. Financial and tax accountants have to improve their skills lest they are left behind by the advancing technology (Hong and Seo, 2018). When huge computational and routine tasks are handled by machines driven by 4IR technology, the

accountant is at risk of losing his relevance, unless he adapts and shifts work focus to analytical work (Meinander and Sordeling, 2019). Accountants might also face overwhelming amounts of information that will be available. A study by De Ruyter *et al.* (2019) established that new technologies would transform workplaces, displace jobs, create new jobs and change living conditions of accountants. How accountants would adapt especially in Africa, forms the basis of this study. However, a South African based review by Ackers (2019) found little effects of 4IR on the role of accountants who were assumed to adapt to changes in technologies.

### **What needs to be done for African accountants to remain relevant in the 4IR era?**

Buritt and Christ (2016) propose that there should be an upsurge of awareness on changes brought about by 4IR through professional development education. They propose that universities should train accounting practitioners through continuous professional development. Ndung'u and Signe (2019) suggest that the labour skills mismatch brought about by 4IR should be fixed because without basics like electricity and internet broadband that support 4IR, talk of becoming 4IR – compliant continues to become a pipe dream. Hong and Seo (2018) propose that accountants should improve their skills in information technology (IT) by collaborating with IT professionals so that they can provide detailed and accurate information to their clients and various stakeholders who use accounting, financial and tax services.

A review by Mohamed (2018) suggests that accountants will need to develop digital skills. Hence accountants have to keep abreast of the latest technology to be able to offer value-added services among them advising clients and proffering strategic insights on critical financial transactions (De Ruyter, 2018). This is supported by Shwab (2016) and Kruskopf *et al.* (2019) who insist that accountants must adapt, shape and adjust the disruption caused by 4IR. Hammaadama *et al.* (2020) laments that not much is being done to adapt to 4IR thus he proposes that preparation is necessary in the area of right application (technology), legislative provision (regulation), and awareness/knowledge (social). The suggestions from Hammaadama *et al.* (2020) imply that accountants cannot go it alone. They have to be assisted by legislation while awareness of 4IR could be from the Professional Accountancy Organisations (PAOs) through development and provision of an effective Continuing Professional Development (CPD) program among other initiatives.

### **Limitations of Prior Research**

This study anchors on limitations from prior studies. For instance, findings by a Malaysian study that Machine Learning offers a completely new set of competencies for both humans and machinery are from the fast developing Asian Region. Hence, this study sets out to establish new skills and competences ideal for accountants in Africa that can make them remain relevant in the 4IR era.

Another facet is also what form of 4IR is relevant to accountants in Africa because what has been implemented in developed countries may not be relevant to African countries due to different levels of development.

While studies on contributions of 4IR towards SDGs are scanty in Africa, more studies are required on the extent to which 4IR is in use in Africa.

There is a dearth of studies to ascertain how far African countries have implemented 4IR towards supporting the African Union Agenda 2063. Borrowing from studies in the developed world which recommended infusing SDGs in the reporting framework, similar studies should be done in Africa to infuse the role of 4IR in SDGs reporting.

Prior research is pessimistic and preaches doom on the effects of 4IR illiteracy. The advancement in 4IR which is ICT – driven, is claimed to have casualties among accountants, yet it is an opportunity for accountants to metamorphose into variations of new and relevant accounting professions. On skills of accountants, prior research has mainly focused on largely the developed world. Are accountants in African countries prepared to adapt to enhanced 4IR based accounting tasks? Another teething issue is the cost of ICT enhancements that facilitate the change to ICT – based skills. That machines can perform accounting tasks faster is not debatable but whether they will replace the human factor (the accountant) is subject of further research given that scanty studies have been done in Africa. It also remains to be seen how extensive the use of 4IR will be in Africa in the foreseeable future.

Studies in America, Europe and Asia have developed strategies for accelerated implementation of 4IR. This study seeks to establish whether those strategies from prior studies are applicable to accountants in Africa. A study from South Africa suggests that 4IR technologies include block chain, AI and virtual private networks. However, the study suggests that limited resources impede the use of 4IR technologies. Hence, this study seeks to gauge perceptions of accountants in Africa on their understanding of 4IR and how they can adapt to this new normal. A claim that the accountancy profession will disappear from the labour market and will most likely be absorbed by other professions is the basis of this study to establish how to save the profession in Africa.

## CHAPTER 3 - RESEARCH METHODS

### Introduction

In this chapter, the research methods used in this study are described and explained. The chapter explains the research design which was used. Focus was also placed on the population of the study, sampling techniques for both the quantitative and qualitative respondents, samples for both the quantitative and qualitative samples. Research instruments used in the study, a questionnaire and an interview guide are explicated. The pilot study and reliability tests conclude discussion of the chapter.

### Research Design

Given the six research questions in Chapter One, pragmatism was chosen as the ideal research philosophy. Pragmatism embraces plurality of methods based on the proposition that studies should use the best philosophical and/or methodological approach that works best for the particular research problem being investigated (Kirk, 2008). The philosophy is associated with mixed-methods. The key advantage offered by an approach that is mixed comprises its holistic and flexible feature in addition to its capability to address the limits of mono-methods. A survey design was employed to gather the perceptions of African accountants that were members of the Pan African Federation of Accountants (PAFA). The research employed both quantitative and qualitative data collection methods which used questionnaires and an interview guide. The key benefits of the quantitative approach for this study were that it would ensure generalisability of the research results and ensure reliable and objective results. The goal of the qualitative approach was to comprehend the practical experiences of the participants of the research.

### Study population and Sampling

The population was drawn from the African Continent and comprised of professional accountancy members. As per the PAFA website, there were 55 Professional Accounting Organisations (PAOs) from 44 member countries. The registered professional accounting members as per the PAFA website (<https://pafa.org.za>) were 114,800. Because every member of PAFA had an equal chance of responding to the questionnaire, the instrument was emailed to all PAOs who forwarded the instrument to their members. AAFA also assisted by circulating questionnaires to its accountancy members and contacts. Some questionnaires were directed to individual members whose emails the researchers could access. The questionnaires were released during the Covid-19 lockdown. That period coincided with the target dates for data collection and eventually data analysis. However, due to the Covid-19 lockdown, 267 accountants representing 0.23% returned completed online questionnaires despite many attempts of persuasions through resending the instrument several times.

The interview was administered to 48 accountants and auditors within two countries that is Rwanda and Zimbabwe. Accountants from other countries could not be contacted through their PAOs as officers were working from home and getting personal phone numbers proved to be very difficult. Their business phones which we got from the internet were not being answered. Interviews were conducted with 12 accountants from Rwanda and 36 from Zimbabwe. A snowball sampling technique was used in order to select those members that the researchers thought would be key informants to the study. Some of those interviewed referred the researchers to other PAO members. Most of the interviewees were known to the researchers while some were referred to by employees of PAOs. Below is a summary of countries that responded to the questionnaire:

**Table 2: Countries providing the Population for the study**

	Number	As a Percentage
PAFA member countries (The Population)	44	100%
Countries which responded to the Questionnaire	14	31.8%

While the online questionnaire was emailed to African countries who are members of PAFA, only 31.8% responded. Reminders were sent many times resulting in a huge jump of responses from a paltry 30 over three weeks to 267 over three months.

#### Data collection

Data were collected using an online questionnaire and an interview guide. A closed-ended questionnaire was designed using mainly a five – point Likert scale which was emailed to Professional Accounting Organisations which are members of PAFA. The questionnaire had seven sections consisting of Section A covering personal data of respondents. The other six sections covered the six research questions. With restricted movement to deliver the questionnaire physically, an online delivery was used. Due to the Covid-19 induced lockdown that resulted in many people not reporting for work, the researchers sent and resent the questionnaire to improve chances of getting responses. Data was collected for three months from 12 January to 12 April 2021.

An interview guide was used to collect qualitative data. Due to the Covid - 19 pandemic, it was not possible to have face to face interviews, hence telephone interviews were conducted with PAO members who were selected through snowball sampling. Marx *et al.* (2020) and Suriant (2020) are in support of interviews to collect data because they are confirmatory and can clear issues that a questionnaire cannot (Twesige *et al.*, 2020).

### **Quantitative Data Analysis**

Data that was generated from the questionnaires was analysed using mainly descriptive statistical techniques. Descriptive statistics were used to describe basic features of data in the study. After receiving the completed questionnaires from the field, a data capture template was designed in the IBM SPSS. After data entry and cleaning of the data, descriptive data analysis was conducted. Descriptive analysis was conducted using mainly frequency distribution tables, pie charts and graphs. Descriptive measures were mainly mean score and standard deviation (measure of dispersion).

### **Qualitative Data Analysis**

ATLAS.ti 9 was the software that was used to analyse responses from interviews. The software was complemented by thematic analysis. ATLAS.ti 9 allows coding, classifying, retrieving and organising qualitative data (Kalpokas and Radivojevic, 2021). Interview data was entered into the software in codes from which themes were deduced. Outputs of the software were customised reports, tables and figures like Word Clouds. Word Clouds showed most frequently stated responses. Direct quotes from interviewees were also outputs from ATLAS.ti 9. On the other hand, thematic analysis is a qualitative data analysis method that involved reading through data sets from interviews and identifying patterns and deriving meanings from the data (Braun and Clarke, 2006).

### **Pilot Study**

A pilot study is a small scale study that is conducted as a precursor to a larger scale study (Connelly, 2008). A pilot study resembles the actual future study in terms of methods and procedures. A pilot study is not necessarily a small exploratory study but a replica of the main study being prepared for. Lessons that are learnt in the pilot study help to improve the full scale study. To conduct a pilot study for this research, fifteen (30) online questionnaires were sent to potential respondents who returned the questionnaires with comments. Most respondents complained that the questionnaire was very long, some questions were unclear, and there were repetitions of the same issues in various sections. The questionnaire was refined by removing ambiguities, repetitions and improving structures of some questions.

### **Reliability**

Reliability measures internal consistency of the research instrument, in this case the questionnaire. The estimation of reliability was ascertained by pilot-testing the instrument and applying IBM SPSS and Cronbach's alpha coefficient used to measure internal consistency of the research questionnaire. For internal consistency and reliability of the items, the Cronbach's alpha should be close to 0.7 and above (Brown, 2002). Thus all the items in Table 3 were found to be reliable for the research.

**Table 3: Testing Reliability of the Items**

Item/Question	Variable	
9	4IR technologies use-7	0.635
10	Applicability of technologies to accounting profession	0.890
11-14	Skills needed for 4IR adoption-25	0.870
15	Level of 4IR usage	0.886
16-17	Organisations state of preparedness (software and hardware	0.824
20	Intervention required-29	0.862
22	Paopdp-13	0.875
	Overall	0.812

### **Conclusion**

Chapter Three elucidated the research design, population, sampling techniques, data collection, data analysis, pilot study and reliability tests. The ensuing chapter analyses data gathered through questionnaires and interviews. Chapter Four seeks to answer whether or not accountants in Africa are ready to use Fourth Industrial Revolution technologies. The knowledge gained from Chapter Four will help in coming up with recommendations on what needs to be done to make accountants 4IR – compliant.

## CHAPTER 4 - DATA ANALYSIS AND FINDINGS

### Introduction

This chapter focuses on findings that address the six objectives of this study. This study used the mixed research approach to gather both qualitative and quantitative data. Quantitative analyses were drawn from the tables and figures. Descriptive statistics were used to explicate quantitative data. Results of interviews were analyzed to buttress findings from data drawn from questionnaires. The data analysis is in the order of the research questions. Data analysis will start with the profiles of respondents then delve into the six research questions.

### Profiles of the respondents

The profiles of respondents are relevant in research because they contribute to the reliability of data that is presented. The results from the survey are in Table 4 and revealed that the majority of the respondents were male, at 77.9% and females were at 22.1% of the respondents. This means that in Africa numbers of female accountants were still very low.

The results on the ages of respondents as presented in Table 4 show that 38.6% of the respondents were between 31 – 40 years of age, 29.6% were between 41 -50 years of age, 19.4% were above 50 years of age and 12.4% were below 30 years of age. The results revealed that the majority of the respondents were above 30 years of age. This implies that the majority of the respondents were mature people who were able to make informed decisions.

Table 4 also shows the employment levels of respondents. The results show that 14.2% were administrative staff, 12.0% were in junior management, 24.7% were in middle management and 49.1% were senior managers. The results revealed that most of the respondents were in high levels of management. The results collected from the survey showed that most of the respondents (73.8%) were in middle and senior management levels. This means that, the data collected from the survey could be relied upon because of the seniority of the respondents

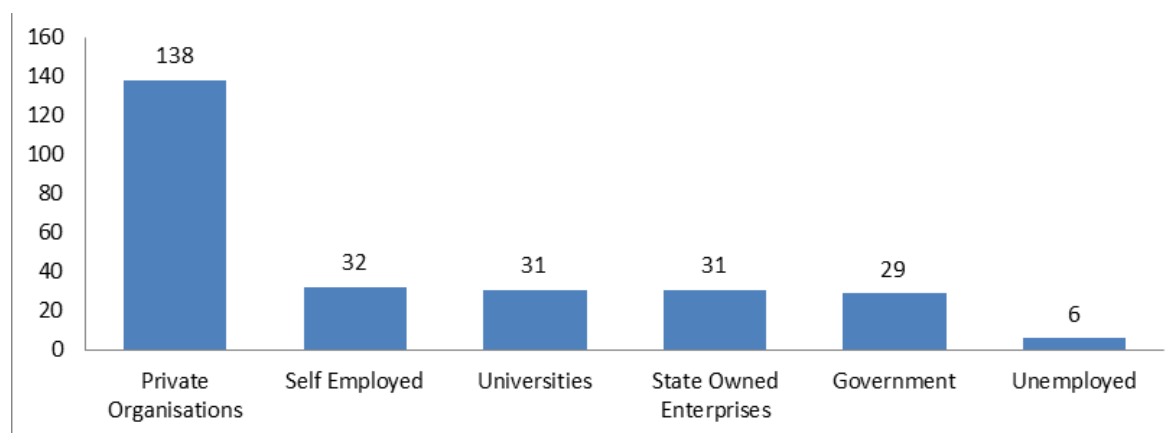
Table 4 further shows the sectors from which respondents were engaged. The results show that the majority of the respondents (51.3%) were from the tertiary sector followed by quaternaries (29.2%), secondary (13.5%), primary sector (3.4%) and audit (2.6%). The results from the survey showed that a vast majority of sectors in accounting were represented in the study.



Table 4: Demographic characteristics of the respondents

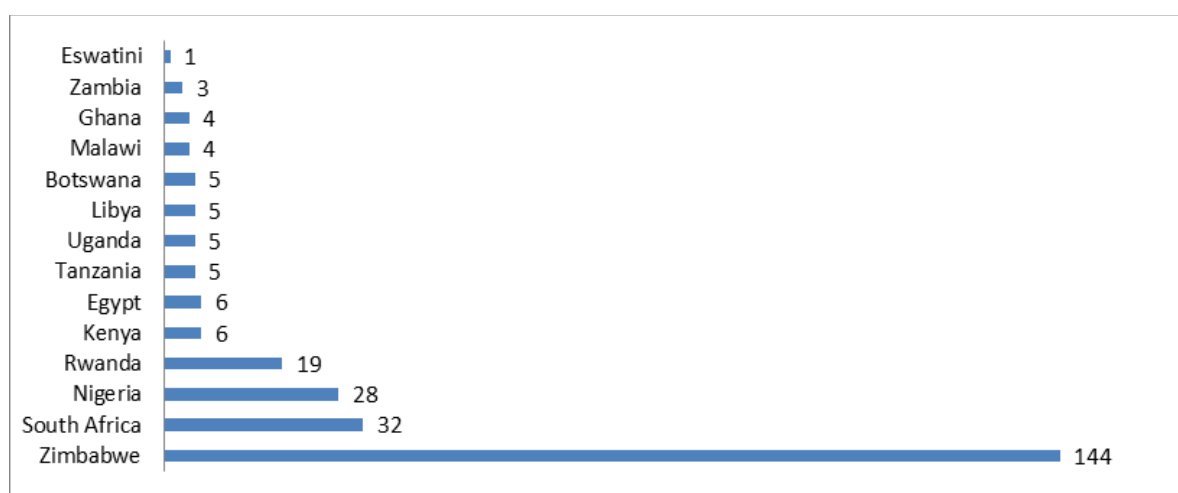
<b>Gender of Respondents</b>	<b>Frequency</b>	<b>Per cent (%)</b>
Male	208	77.9
Female	59	22.1
<b>Total</b>	<b>267</b>	<b>100.0</b>
<b>Ages of Respondents</b>		
16 – 20	103	38.6
41 – 50	79	29.6
Above 50	52	19.4
21 – 30	29	12.4
<b>Total</b>	<b>267</b>	<b>100.0</b>
<b>Employment levels of Respondents</b>		
Senior management	131	49.1
Middle management	66	24.7
Admin – Accounts staff	38	14.2
Junior management	32	12.0
<b>Total</b>	<b>267</b>	<b>100.0</b>
<b>Experience of Respondents</b>		
16 and above	111	41.6
11 – 15 years	67	25.1
5 – 10 years	58	21.7
Less than 5 years	31	11.6
<b>Total</b>	<b>267</b>	<b>100.0</b>
<b>Sector of the Respondents</b>		
Tertiary	137	51.3
Quaternaries, education, R & D	78	29.2
Secondary	36	13.5
Primary	9	3.4
Audit Practitioners	7	2.6
<b>Total</b>	<b>267</b>	<b>100.0</b>

The information presented in Figure 1 show the different organizations in which the respondents were employed. The findings revealed that the majority of the respondents came from private organizations (n=138, 51.7%) followed by self-employed (n=32, 12.0%), universities (n=31, 11.6%), state owned enterprises (n=31, 11.6%), Government (n=29, 10.9%) and unemployed (n=6, 2.2%). The results from the survey imply that a cross section of organizations was represented in the study, and the private sector came out as the highest employer of accountants.



**Figure 1: Organisations Respondents worked for**

Figure 2 shows countries from where data was collected. Results from the survey show that respondents were from 14 out of 44 PAFA member countries. The majority of the respondents (n=223, 83.5%) were from four (4) countries as follows: Zimbabwe (n=144, 53.9%), South Africa (n=32, 12.0%), Nigeria (n=28, 10.5%) and Rwanda (n=19, 7.1%). The rest of the ten (10) countries contributed a low response (n=44, 16.5%). The dominance of Zimbabwe in responding to the survey was caused by the links between the Zimbabwean researchers and members of PAOs since the researchers belonged to such organisations as CA, ACCA, CIS, CIMA or CPA. Standards used in compiling financial statements and carrying out audits are the same since all accountants and auditors are members of PAFA, thus it was assumed that there was no bias in the results.



**Figure 2: Countries of the respondents**

### RQ1 What is the nature of 4IR technology?

Respondents were asked to indicate to what extent their organisation used various 4IR technologies. The responses of accountants were meant to establish the nature and state of 4IR technologies. Among all the 4IR technologies shown in Figure 3, only internet of things was the most dominant technology used and known by the respondents. The overall mean of 2.41 showed that the nature of 4IR technology was still blurred with the majority of respondents disagreeing with the notion that the technologies in the table were in use in their organisations.

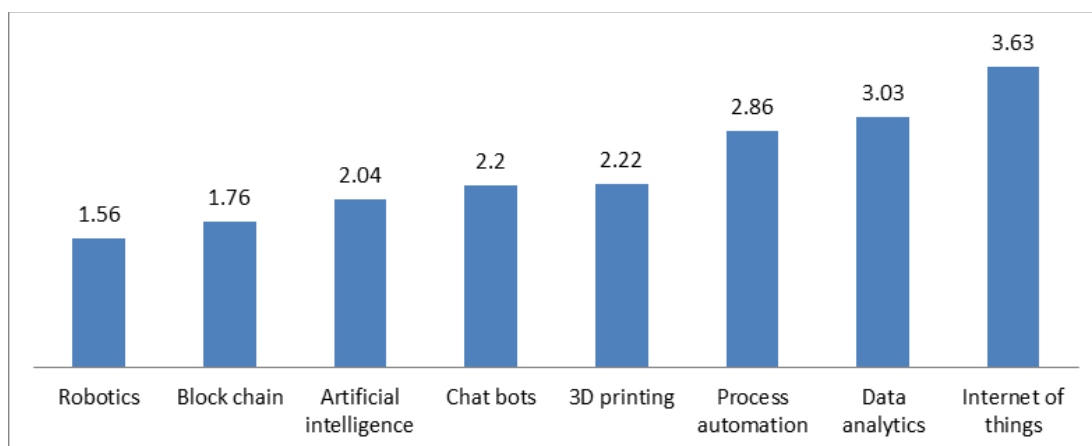


Figure 3: The Nature of 4IR technologies

Key: 1= not at all to 5= to a greater extent.

On whether respondents had heard about 4IR, Table 5 shows a mean score of 3.75 which meant that they had heard about the concept. On whether accountants agreed or disagreed with whether accounting and audit work was demanding new digital skills, respondents, as indicated by a mean score of 4.48, convincingly agreed that the nature of 4IR expected accountants to have digital skills.

Table 5: Nature of 4IR aspects applicable to your institution

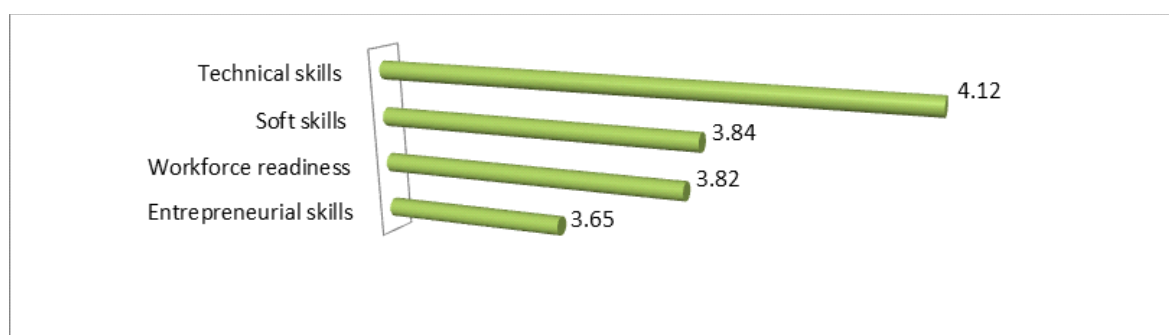
	Mean
Accounting and auditing work are currently demanding new digital skills	4.48
I have heard about the Fourth Industrial Revolution (4IR)	3.75
<b>Overall Mean</b>	<b>4.12</b>

Key: 1. Strongly Disagree 2. Disagree 3. not sure 4. Agree 5. Strongly agree

## RQ2 What are the required skills to utilise 4IR technology?

Respondents were asked to rate the skills that were required in 4IR. The results in Figure 4 show that for employees to effectively work in 4IR, they required technical, soft and entrepreneur skills. This is evidenced by an overall mean score of 3.86. A majority of respondents agreed that they required different skills to be able to work effectively. Although the results revealed that accountants required a variety of skills to be able to work in 4IR, accountants needed more technical skills than any other skills as evidenced by a mean score of 4.12.

**Figure 4: Level of skills an employee should possess to work effectively in 4IR**



**Key:** 1= very low level to 5=very high level

Interviewees were also asked to identify skills that are required by African accountants in this era of 4IR. The respondents identified soft (or human), technical and entrepreneurial skills as well. When compared to results from questionnaire that had technical skills on top, interviewees had human skills on top followed by technical and then entrepreneurship skills. The dominant human skills identified were strategic management, critical thinking, emotional intelligence and interpersonal skills while information technology skills topped the technical skills list.

The interview and questionnaire results confirmed findings from previous studies. Goldin and Katz (2008) established that emotional intelligence and critical thinking abilities are inherent in humans while Wahyuni (2018) established that accountants must possess both technical and social skills. Nguyen *et al.* (2020) and Marx *et al.* (2020) in support, show that communication, conflict resolution, leadership, risk management, decision making, emotional intelligence, innovation creativity and customer service orientation skills are very important in this era of 4IR. Similar findings are also evident in the study conducted by the (World Economic Forum, 2016).

Respondents were asked to rate the soft and technical skills shortcomings among young graduates joining organisations in relation to the 4IR. Findings from Table 6 revealed that there were shortcomings in relation to communication skills as evidenced by a mean score of 4.51. The overall

mean score of 3.17 corresponds to neither high nor low, thus implying divergent views as to the existence of soft skills which are required to enhance the adoption of 4IR. This is further buttressed by the many high standard deviations that are greater than 1.0. There were outliers that were those with soft skills and those without. This implies that there were average soft skills among the young graduates joining organisations. This creates a major challenge in implementation of 4IR since it requires strong social and technical skills as indicated in the study conducted by Wahyuni (2018). A study by Klaus (2017) also established that there is a gap in soft skills among the young graduates.

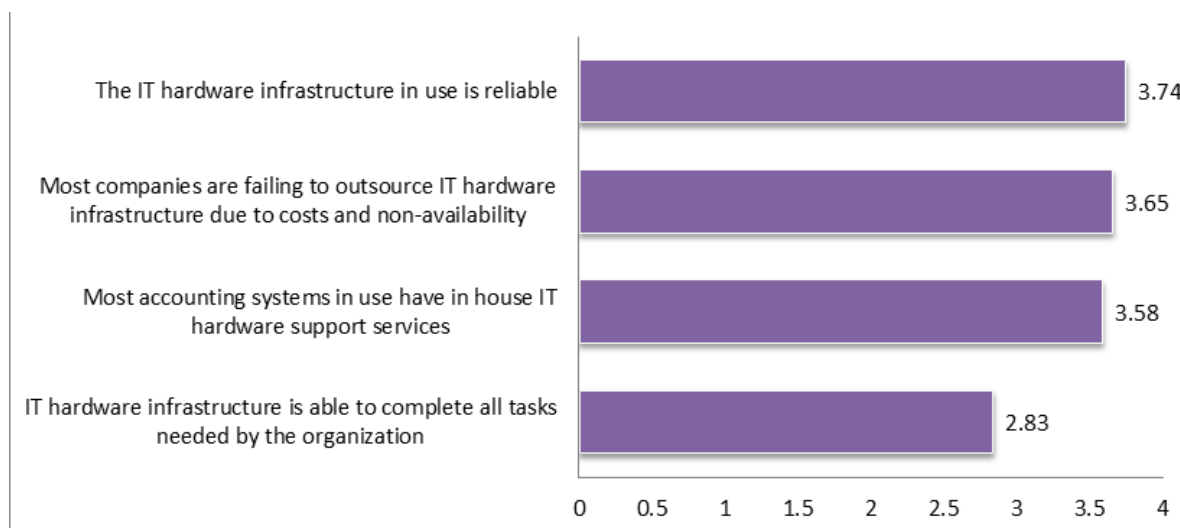
**Table 6: 4IR skills shortcomings in young graduates joining organizations**

	Mean	Standard deviation
Communication skills	4.51	0.738
People management skills	3.24	1.016
Critical thinking skills	3.21	1.143
Analytical skills	3.18	1.042
Service orientation skills	3.17	1.077
Understanding the capability of technology	3.17	1.050
Data visualization skills	3.16	1.082
Judgment and decision making skills	3.12	1.101
Emotional intelligence	3.08	1.098
Complex problem solving skills	3.06	1.214
Coordinating skills	3.01	1.115
<b>Overall Mean</b>	<b>3.17</b>	

**Key:** 1=Very low level to 5=Very high level

### Rq3 To what extent is 4IR technology in use?

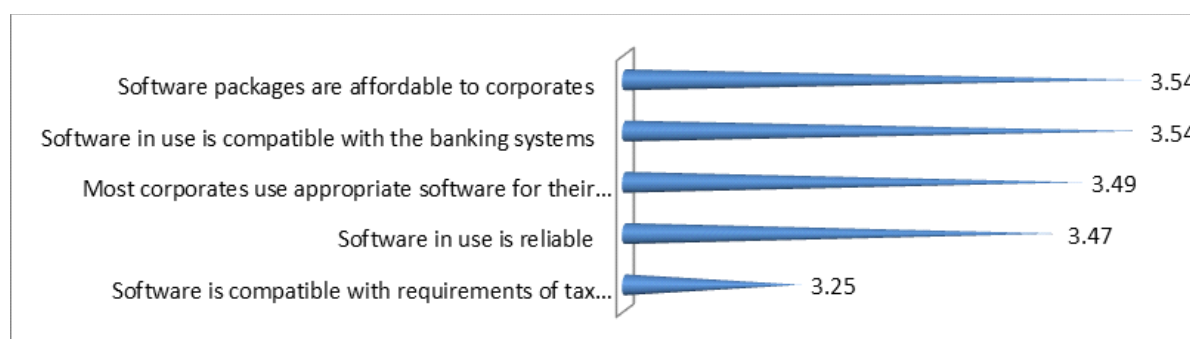
In Figure 5 respondents were asked to state their IT hardware experiences in the use of 4IR. The results show that respondents agreed that IT hardware in use was reliable (3.74) and most companies were failing to outsource IT hardware infrastructure due to costs and non-availability (3.65). The results further revealed that most accounting systems in use have an in-house IT hardware support service as indicated by a mean score of 3.58. The overall mean score of 3.45 implies that professionals are not sure whether organisations have necessary hardware. The high variances above 1.000 show the existence of outliers i.e. some had adequate and others had inadequate IT hardware



**Figure 5: Indicate the organisation's accounting IT Hardware experience**

**Key:** 1. Strongly Disagree 2. Disagree 3. Not sure 4. Agree 5. Strongly agree

In Figure 6, the respondents were asked to assess the extent to which software was used in their organisations. The results from the survey show that respondents were not sure whether corporations had the necessary software to support the adoption of 4IR. This is evidenced by the overall mean score of 3.46. This means that respondents neither disagreed nor agreed that available software was adequate.



**Figure 6: Extent to which 4IR software is used by corporations in Africa**

**Key:** 1=Strongly disagree, 2=Agree, 3=Not sure, 4=Agree and 5=Strongly agree

Interviewees were asked to identify the software that was used in their daily activities. The results indicated accounting, database management, intranet, statistical analysis, on-line storage and audit software as the most commonly used software. Accounting software was the most used across the two nations, Zimbabwe and Rwanda from where interviewees were drawn. There were several least popular 4IR technologies like big data and internet of things, e-filing of taxes among others. Two Zimbabwean interviewees indicated that they did not use 4IR technologies at all at their organisations. One of the interviewees explained that they *“...have not made any significant investment in technology and hence we are still laden with clerical work...”* Asked if accountants would be relevant and competent with or without the use of 4IR, the majority of interviewees indicated that accountants will still be relevant. The results support findings by Salazar *et al.* (2019) and Man and Man (2019) who noted that there was still need to upgrade the use of 4IR technologies by accountants in Africa.

Interviewees were also asked how their organisations had benefited from 4IR technologies. The benefits accruing from the use of 4IR technology were time effectiveness, improved communication, quality reports, accuracy, real-time processing, voluminous data processing, increased productivity, remote working and prevention of fraud. To drive the point home, one interviewee said:

*“...with the way things are moving, 4IR is necessary. How can accountants process data without that technology? 4IR Technologies are needed to simplify the way accountants work. This will increase productivity per skilled labour. By just looking into the past one-year of Covid-19, one example that justifies the need for new technologies and the need for accountants to have the capacity to utilise the new technology has been heightened. Without that, the accountancy profession will become irrelevant....”*

The above statements added another benefit of using 4IR technology in accounting, which was the ability to work remotely. This became even more important during times of natural disasters and pandemics like Covid-19.

Interviewees identified financial constraints as one of the restrictions affecting the ability of African accountants to adopt 4IR technologies. This included costs of establishing and maintaining the right technology as well as training and re-training accountants. One interviewee was quoted saying: *“...the huge costs in ICTs for new technologies require investments and also technologies need to be upgraded every time. Software requires annual licenses which are also very expensive.”* Some stated that inadequate funding led to poor network connectivity. Another restriction raised on the use of 4IR was lack of government support in ICT infrastructural development.

#### RQ4 How do accountants in Africa currently utilise 4IR to contribute to SDGs and Agenda 2063?

In Table 7, respondents were asked how 4IR contributed to the achievement of SDGs and the African Union Agenda 2063. The results show that respondents agreed that 4IR technologies improved the standard of living and reduced social marginalisation as evidenced by the mean score of 3.68 and 3.97 respectively. However, the overall mean of 3.49 implies that respondents neither disagreed nor agreed on the contribution of 4IR to the UN SDGs and African Agenda 2063. This is further reflected with a deviation of 1.000 for all four items.

**Table 7: Contribution of 4IR to UN SDGs and African Union Agenda 2063**

	Mean	Standard Deviation
Technologies adopted reduced social marginalization	3.97	1.002
4IR technologies adopted improved standards of living	3.68	1.081
4IR technologies have enhanced equal access to financial resources	3.17	1.062
4IR technologies have improved contextual intelligence of citizens	3.13	1.042
<b>Overall mean</b>	<b>3.49</b>	

**Key:** 1=Strongly disagree, 2=Agree, 3=Not sure, 4=Agree and 5=Strongly agree

Interviewees were asked to identify contributions of 4IR in achieving SDGs and the African Union Agenda 2063. Interviewees pointed out that 4IR brought uniformity in the work of accountants in performing tasks. ICT eased manual work, improved agricultural productivity, reduced environmental pollution, improved health services, financial inclusion and knowledge sharing. These benefits were critical for achieving SDGs and African Agenda 2063. Results from the survey agreed with findings from previous studies conducted by Addaney (2018) and Ndizera and Muzee (2018) which posit that 4IR is helping Africa to achieve good governance, democracy, common heritage, value and ethics, justice and rule of law. The study conducted by Pollitzer (2018) shows that 4IR created a positive socio-economic change. Nel and Masilela (2019) highlight that 4IR improved service delivery and innovation in South Africa.

#### RQ5 How has or how will 4IR affect the work of accountants in Africa?

In Table 8, respondents were asked whether the technological innovations that come along with 4IR had improved the role of accountants. The results show that technological innovations had greatly transformed the role of accountants as shown by an overall mean score of 3.84. The results concurred



with findings from Kiconco (2020) who posits that use of big data by accountants helps them to analyse big volumes of data. In support, Umeh (2010) asserts that computerization enhances effective and efficient financial reporting and forms a cornerstone for professional management.

**Table 8: 4IR and how it affects the works of accountants in Africa**

	Mean	Standard Deviation
Enterprise Resource Planning	4.09	0.878
Social media	4.08	0.888
Taxation software Innovations	4.05	0.905
Forensic accounting	3.94	0.979
Internet of things	3.90	0.938
Artificial intelligence and machine learning	3.78	1.033
Cloud computing	3.02	1.128
<b>Overall mean</b>	<b>3.84</b>	

**Key:** 1=Strongly disagree, 2=Agree, 3=Not sure, 4=Agree and 5=Strongly agree

In Figure 7 the respondents were asked to express their opinion on the applicability of 4IR in accounting work. The findings from the survey show that 4IR was creating new avenues in accounting work. The results indicated high mean scores in creating new jobs, transformation of work places and handling of huge computational and routine tasks as evidenced by mean scores of 4.15, 4.11 and 4.03 respectively. The overall mean score for all items of 3.98 implied that the majority of respondents were of the view that 4IR technologies were applicable and affected the accounting profession as professionals sought to improve audit quality, reduction of audit risk, need to transform work places among others.

**Figure 7: Applicability of technologies in the accounting profession**



**Key:** 1=Strongly disagree, 2=Disagree, 3=Not sure, 4=Agree and 5=Strongly agree.

## RQ6 What needs to be done for African accountants to remain relevant in the 4IR era?

This section sought to answer the final question: What needs to be done for African accountants to remain relevant in the 4IR era? In Table 9, respondents were asked whether the relevance of accountants in 4IR era was enhanced by continuous professional development and availability of internet facilities. The results from the survey show that respondents neither disagreed nor agreed. This is evidenced by an overall mean score of 3.22 and a high standard deviation of about 1.1. The results from the survey are in contradiction with existing research results. Goldin and Katz (2008), Klaus (2017) and Akhter and Sultana (2018) have indicated the importance of internet of things in improving the skills of accountants. KPMG (2020) recommends continuous professional development of accountants to match the current skills required in the job market.

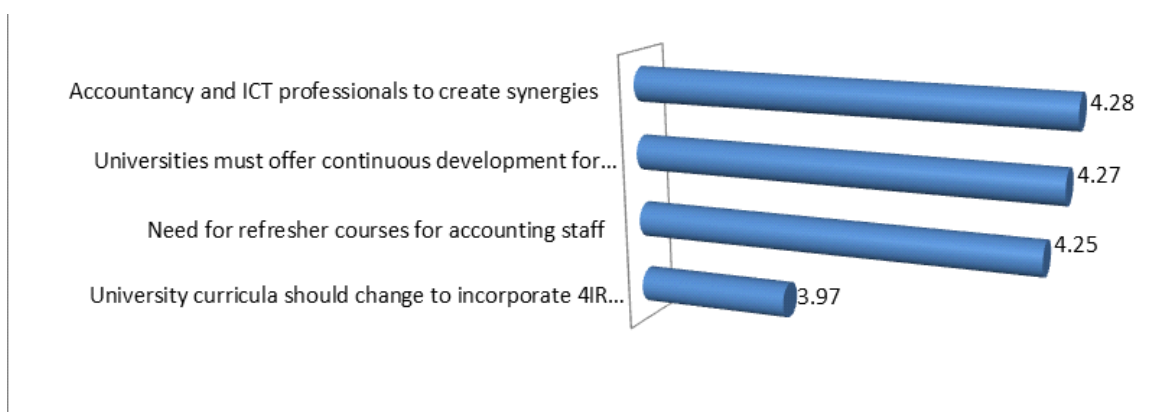
**Table 9: The extent to which respondents access 4IR**

	Mean	Standard Deviation
Relevance of accountants in 4IR era is enhanced by continuous development	3.22	1.065
Availability of internet facilities enhances accountants understanding of 4IR	3.21	1.077
<b>Overall mean</b>	<b>3.22</b>	

Key: 1=Strongly disagree, 2=Agree, 3=Not sure, 4=Agree and 5=Strongly agree

In Figure 8, respondents were asked to determine whether various forms of continuous professional developments (CPD) were necessary for accountants to cope with 4IR. The results from the survey show that respondents agreed that there was a need to develop the skills of accountants in Africa as evidenced by an overall mean score of 4.19. This could be done if universities offered continuous professional development courses for accountants and developed curricula that incorporate 4IR concepts. Other ideas included creating synergies between the accountancy and ICT professionals and providing refresher courses to accounting staff in relation to concepts of 4IR.

Figure 8: Professional Development of accountants to cope with the advent of the 4IR



Key: 1=Strongly disagree, 2=Agree, 3=Not sure, 4=Agree and 5=Strongly agree

Interviews confirmed the same aspect of improving the curricula as shown in the word cloud results in Figure 9 below.



Figure 9: What needs to be done to develop accountants to cope with 4IR?

When asked about what universities could do to ensure accountants remained relevant, the majority of interviewees felt that there was an urgent need to improve curricula by including 4IR - related topics, while some interviewees felt ethics empowerment was necessary for survival in the 4IR era. The need for continuous training of accountants was prominent among interviewees. Questionnaire results also agree that CPD and curriculum change will buttress 4IR needs of accountants. The findings agreed with Danimir *et al.* (2019) who established that 4IR technological skills were not available in the accounting curriculum. In support Adriana *et al.* (2019) found that ethics teachings should be increased to reduce the risk of fraud associated with technology. Buritt and Christ (2016) had earlier

proposed that universities should train accounting professionals through professional development education.

In Table 10, respondents were asked to rank the key areas they needed to develop in order to avoid redundancy in 4IR. The results from the survey show that accountants required development in different technological areas to survive redundancy. The overall mean score of 4.39 implies that respondents agreed that they required skills in cloud computing, big data analysis, globalization outsourcing, tax regulations, and new forms of corporate reporting, integrated reporting and carbon emission. Results from the interviews also confirmed that human skills were still needed to complement 4IR technologies. This confirmed that 4IR should have a human element behind it.

**Table 10: Key areas that accountants need in order to survive redundancy**

	Mean	Standard Deviation
Big data analysis	4.58	0.834
Digital technology courses (cloud computing) technology	4.45	0.841
Globalisation- outsourcing	4.45	0.789
Evolving regulations e.g. tax regulations	4.39	0.879
Carbon emission accounting	4.33	0.824
Integrated reporting	4.31	0.864
New forms of corporate reporting	4.21	0.871
<b>Overall mean</b>	<b>4.39</b>	

**Key:** 1=Strongly disagree, 2=Agree, 3=Not sure, 4=Agree and 5=Strongly agree

Interviewees were of the idea that the work of accountants was going to be threatened if they did not reskill, with one interviewee indicating that they “.... would be irrelevant in the long run....” Another interviewee said:

*“.....as the things in this world keep on changing, accountants' knowledge and skills must evolve as well. African accountants need to continue improving their skills towards modernised skills and solving new problems faced by their countries. This is done through continuing professional development, research and learning from the accounting profession from advanced countries.”*

The findings are in agreement with De Ruyter *et al.* (2019) who established that new technologies would transform workplaces, displace jobs, create new jobs and change living conditions of accountants. Furthermore, results were in agreement with Slyzko *et al.* (2019) that if accountants did not change, the accounting profession would disappear from the labour market and would be absorbed by other professions.

It was almost unanimously agreed by interviewees that a curriculum inclusive of 4IR Technology would enhance the training of accountants. A few interviewees suggested the need to move from face to face learning to on-line learning to enhance the teaching of accounting. This is in agreement with Adriana *et al.* (2019) and Surianti (2020) who assert that 4IR technologies have shifted the role of accountants and the curriculum has to respond quickly so that graduates meet the labour market expectations. The inclusion of 4IR technologies in curriculum was once suggested by Akhter and Sultana (2018) who posit that education institutions need to ensure that all accountants are equipped with proper contemporary accounting technological skills.

From the interviews, strategies needed by accountants in Africa to remain relevant were; training on strategic thinking, 4IR Technologies and getting internationally recognised certifications. Another recommendation from interviewees was that accountants needed to possess both technical and social skills. The study thus concluded that African Accountants should focus mainly on tasks that machines cannot do and this included strategic thinking.

Interviewees suggested topics for training and professional development in 4IR. The suggested areas focused more on technical development as compared to human and entrepreneurship skills. This suggests that there are more technical skills gaps as compared to human and entrepreneurship skills gaps. The most common technical skills suggested by interviewees included artificial intelligence, machine learning, cyber security, robotics, coding, big data analysis, cloud computing and block chain. Other areas of interest for the training of accountants were cited as Enterprise Resource Planning (ERP), computerised audit, data analysis, IT forensic data analysis, machine learning, robotics, bitcoin and its risks to the monetary system, cyber security, cloud computing and artificial intelligence.

## **Conclusion**

The chapter mainly reported research findings and discussed these findings, their implications and link to prior research. The research attempted to establish whether accountants in Africa had the skills required to harness 4IR technologies in the quest to improve their work outputs and communities according to the African Union Agenda 2063 and Sustainable Development Goals. The study also sought to establish the extent to which accountants are using 4IR technologies, the effects on their work and what needs to be done for them to remain relevant in the 4IR era. The following chapter covers the conclusions made by this research, recommendations and areas for further study.

## CHAPTER 5 – SUMMARY AND RECOMMENDATIONS

### Summary

The results relating to the first research question indicated that accountants in Africa had heard about 4IR and the Internet of Things seemed the most dominant technology used and known by accountants. However, results show that in-depth knowledge of the nature of 4IR technologies was still low among the majority of the accountants.

The second research question assessed the skills needed by accountants in Africa to be able to use 4IR. The results show that, accountants required soft, technical and entrepreneurial skills. Accountants required a variety of skills to be able to work in 4IR; they needed technical more technical than any other skills. Other skills identified were human (or soft), technical and entrepreneurial skills as core to 4IR adoption. Human skills identified were strategic, critical thinking, emotional intelligence and interpersonal capabilities. Information technology skills were the technical skills required by 4IR. The study found that accountants possessed an average level of skills to use big data analytics and block chain technologies. The results further indicate that there were low levels of skills in the usage of machine learning, robotics and artificial intelligence.

The third research question assessed the extent to which 4IR technology was used. Results show that IT hardware in use was reliable although most companies were failing to outsource IT hardware infrastructure due to high costs. Most accounting systems in use had an in-house IT hardware support service. On the types of software used by accountants, results indicated accounting, database management, intranet, statistical analysis, on-line storage and audit software. There were several least popular 4IR technologies such as big data and e-filing of taxes. The most stated benefit of 4IR technology was time effectiveness, improved communication, quality reports, accuracy, real-time processing, voluminous data processing, increased productivity, remote working and prevention of fraud. However, financial challenges were cited as a restriction affecting the ability of African accountants to adopt 4IR technologies. The financial challenges included costs of establishing and maintaining the right technology as well as training and re-training of accountants. Inadequate funding was also found to result in poor network connectivity. Other restrictions to 4IR use were lack of government support for ICT infrastructural development.

The fourth research question assessed how accountants utilized 4IR technologies to contribute to SDGs and Agenda 2063. The study showed that 4IR technologies improved the standard of living and reduced social marginalization. Other findings were that 4IR brought uniformity in the work of accountants in performing their duties. It was also established that ICT eased manual work, improved

agricultural productivity, reduced environmental pollution, improved health services, financial inclusion and knowledge sharing. These benefits were critical for achieving SDGs and the African Agenda 2063.

The fifth research question was to determine how 4IR would affect the work of African Accountants. The results showed that technological innovations had greatly transformed the role of accountants, thus helped to improve the contribution of accountants to create value at their work places. The study showed that 4IR was creating new avenues in accounting work like new jobs, transformation of work places and handling of huge computational tasks. Results of the study also pointed at 4IR technologies that were used by the accounting professionals to improve audit quality, reduce audit risk and transform work places among others.

The sixth research question sought to find out what Accountants in Africa needed to do to remain relevant in the 4IR. The study established that there was a need to develop their 4IR skills. This could be done if universities offered continuous professional development programs, develop curricula that incorporates 4IR concepts, create synergies between the accountancy and ICT professionals and providing refresher courses in relation to concepts of 4IR. Other strategies were training on strategic thinking and getting internationally recognised qualifications. The most common technical skills recommended by the study included artificial intelligence, machine learning, cyber security, robotics, coding, big data analysis, cloud computing and block chain.

#### Recommendations

The study proffers recommendations that are meant to improve the readiness of accountants in Africa to use 4IR technologies to improve their work. The recommendations are as follows:

- The results of the first research question indicated that accountants in Africa had heard about 4IR and the Internet of Things seemed the most dominant technology used although results show that in-depth knowledge of the nature of 4IR technologies was still low among the majority of the accountants. The study recommends that PAOs, universities and employers should produce a digital workforce for the future through training of their members on the trending technologies like block chain and robotics that reduce manual work and improve efficiency.
- The second research question assessed the skills needed by accountants in Africa to be able to use 4IR. The study found that accountants possessed an average level of skills to use big data analytics and block chain technologies. The results further indicate that there were low levels of skills in the usage of machine learning, robotics and artificial intelligence. The training of

accountants should embrace the use of 4IR technologies to improve audit quality and minimise audit risk. While universities train auditors to a certain basic level, PAOs should be on the look out to ensure that new relevant technologies are taken on board and their staff can use them.

- The third research question assessed the extent to which 4IR technology was used. Failure to improve on the use of 4IR technologies was a result of financial challenges to procure 4IR technologies, failure to re-train accountants, poor network connectivity and lack of government support for ICT infrastructural development. The study recommends that employers should sponsor the retraining of accountants, improve network connectivity at their workplaces and governments should facilitate ICT infrastructural developments.
- The fourth research question assessed how accountants utilized 4IR technologies to contribute to SDGs and African Agenda 2063. It was established that ICT eased manual work, improved agricultural productivity, reduced environmental pollution, improved health services, financial inclusion and knowledge sharing. These benefits were pivotal for achieving SDGs and the African Agenda 2063. The study recommends that African Governments should make policies that promote foreign direct investment in the field of computer, other 4IR hardware and software manufacturing. That would in turn make ICT hardware, software and 4IR technologies affordable and available to accountants.
- The fifth research question was to determine how 4IR would affect the work of African Accountants. The study showed that 4IR was creating new avenues in accounting work like creating new jobs, handling of huge computational tasks, improved audit quality and reduced audit risk among other benefits. The study recommends that accountants should challenge their companies to do in-house software programming that would assist in making their work more efficient and effective. In-house software programming is cheaper than off-the-shelf packages. Off-the-shelf packages are charged annual licenses unlike custom-made software.
- The sixth research question sought to determine what accountants in Africa needed to do to remain relevant in the context of 4IR. The study established that accountants should develop their 4IR skills. This could be done if universities offered continuous professional development programs, develop curricula that incorporates 4IR concepts, create synergies between the accountancy and ICT professionals and providing refresher courses in relation to concepts of 4IR. Other strategies were training on strategic thinking and getting internationally recognised qualifications. The most common technical skills recommended for accountants were, among others, artificial intelligence, machine learning, cyber security, robotics, coding, big data analysis, cloud computing and block chain. The study recommended that accountants should continuously train and retrain on new and trending technologies like computerized audits, big data analytics, machine learning, artificial intelligence, robotics, bit coin and its risks in the



monetary systems, cyber security in 4IR, cloud computing and information management systems. PAOs should continuously train their members on trending 4IR technologies. Universities should continuously upgrade their curricula for training accountants to match international standards.

### **Limitations of the Study**

While the online questionnaire was availed to accountants in African countries that were members of PAFA, only 267 out of 114,800 (0.23%) PAFA members responded. Of the 267 responses, the majority of 83.5% were from four countries namely Zimbabwe, South Africa, Nigeria and Rwanda. Zimbabwe alone contributed 53.9% of the respondents. The Zimbabwean responses could be a source of bias.

Findings of this study must be taken in light of inherent limitations of the research. After recording very low responses, the questionnaire was resent five times. Only 14 out of 44 PAFA member countries responded despite several persuasions. Perceptions of the 267 accountants may not be generalised to apply to the whole African continent. Another limitation is the exclusion of most accountants who were not members of PAFA yet they were practicing accountants. Their contributions could have buttressed findings of this study.

The other limitation was in the mode of questionnaire delivery. Due to the Covid-19 lockdowns on the whole continent, the online method yielded a poor response. Had there been no Covid-19 restrictions, questionnaires could potentially have been physically delivered to offices of accountants. This method of physical delivery would have brought another shortcoming of insufficient financial resources to pay research assistants.

### **Areas for Further Studies**

There are a number of further research agendas that could be pursued in future:

- The Fourth Industrial Revolution is prevalent in day to day operations, thus research should focus on specific proficiencies in specific technologies that are required to create value in the accountancy profession.
- Further research should investigate ways of improving skills of accountants, who in essence are trained to be proficient in technical, entrepreneurial and critical thinking.
- It may be of paramount importance to investigate how African governments are geared to support foreign direct investment in 4IR hardware and software to ensure that prices of these technologies become affordable to improve 4IR pervasion in the working environments of African accountants.

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## APPENDICES

### APPENDIX 1: *LETTER OF INTRODUCTION TO CARRY OUT RESEARCH*



Pan African Federation of Accountants (PAFA) and African Accounting & Finance Association (AAFA)

AFRICAN ACCOUNTING & FINANCE RESEARCH INITIATIVE (AAFRI) 2020-2021

30 September 2020

Dear Sir/Madam

A Letter of Introduction for AAFA and PAFA Funded Research Project on “The Fourth Industrial Revolution (4IR): Assessing readiness of the accountancy profession in Africa”

A team consisting of Zimbabwean and Rwandan researchers is carrying out a research project supported and funded by AAFA and PAFA on the topic entitled “*The Fourth Industrial Revolution (4IR): assessing readiness of the accountancy profession in Africa.*” The aim of this study is to gather insights on the extent of use of 4IR technologies by African accountants to enhance their work. Results of this survey are intended to contribute to knowledge on the readiness of African accounting professionals to contribute to the African Union Agenda 2063 and Sustainable Development Goals (SDGs) as approved by the United Nations in 2015.

We are kindly encouraging you to respond to the accompanying questionnaire as the research will be of benefit to the accounting profession in Africa. The results of the research will be published on the websites of AAFA and PAFA. Respondents who wish to get a copy of the results of the study should send their request to the Lead Investigator whose contact details are provided below. This questionnaire will take about 10 minutes to complete.

All information collected will be treated with strict confidentiality and anonymity. The full list of the project team members is provided below.



If you have any queries, questions or concerns about this study, please contact the Lead Investigator, Dr. Obert Sifile at +263772410226, [osifile@cut.ac.zw](mailto:osifile@cut.ac.zw) / [osifile@gmail.com](mailto:osifile@gmail.com) or Chinhoyi University of Technology, P. Bag 7724, Chinhoyi, Zimbabwe.

Alternatively, please do not hesitate to contact the AAFA or PAFA for further clarifications you may require.

Yours sincerely,



Mr. Vickson Ncube  
Chief Executive Officer, PAFA



Prof. Teerooven Soobaroyen  
President, AAFA

### Project Team:

**Dr. Obert Sifile**, (Chinhoyi University of Technology, Zimbabwe, Department of Accounting and Finance)-**Lead Investigator**

**Dr. Daniel Twesige**, (University of Rwanda, College of Business and Economics, School of Business, Department of Accounting)

**Dr. Faustin Gasheja**, (College of Business and Economics, University of Rwanda)

**Dr. Edson Gwangwava**, (Chinhoyi University of Technology, Zimbabwe, Department of Accounting and Finance)

**Dr. Shepard Makurumidze**, (Chinhoyi University of Technology, Zimbabwe, Department of Accounting and Finance)

**Dr. Kudzanai Matowanyika**, (Chinhoyi University of Technology, Zimbabwe, Department of Accounting and Finance)

**Mr. Shakemore Chinofunga**, (Chinhoyi University of Technology, Zimbabwe, Department of Accounting and Finance)

**Dr. Ranga Mbizi**, (Chinhoyi University of Technology, Zimbabwe, Department of Accounting and Finance)

**Mr. Kalisa Sunday**, (Institute of Certified Public Accountants of Rwanda, ICPAR)



## APPENDIX 2: QUESTIONNAIRE



Pan African Federation of Accountants (PAFA) and African  
Accounting & Finance Association (AAFA)



### QUESTIONNAIRE FOR ACCOUNTANTS AND AUDITORS

Dear Respondent

We are carrying out a research supported and funded by AAFA and PAFA on a topic entitled “The Fourth Industrial Revolution (4IR): assessing readiness of the accountancy profession in Africa.” The aim of this study is to get insights on the extent of use of 4IR technologies by African accountants to enhance their work. Results of this survey are intended to contribute to the knowledge on the readiness of accounting professionals in Africa and how that knowledge contributes to the African Union Agenda 2063 and Sustainable Development Goals (SDGs) adopted by the United Nations in 2015. Your participation in this research is voluntary. Confidentiality and anonymity of your contribution will be maintained. If you have any queries, questions or concerns about this study, please contact the Lead Investigator at +263772410226 or [osifile@cut.ac.zw](mailto:osifile@cut.ac.zw). The questionnaire will require about 10 minutes of your time.

Thank you in advance for your cooperation.

Please answer the following questions by putting a *Tick* in the box that corresponds with your preferred response. Your responses will be confidential and for scientific research only.

**Section A - Personal data:**

(Please tick or put x in the appropriate box that corresponds with your response)

**1. Gender:**

Male		Female	
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**2. Age (in Years):**

21-30		31-40		41-50		Above 51	
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**3. Educational Level:**

Certificate		Diploma		Undergraduate		Post Graduate	
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**4. Employee Level:**

Admin-Accounts Staff		Junior Management	
Middle Management		Senior Management	
Other			

**5. Years of Experience:**

Less than 5 years		5-10 years		11-15 years		16 years and above	
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**6. Which sector do you operate in?**

Primary (Extractive like farming, fishing, mining)	
Secondary (Finished goods – Manufacturing, construction, utilities)	
Tertiary (Services – banking, financial, hospitality, real estate, IT)	
Quaternary (Education, public sector, research and development)	

**7. I work for:**

A Government Ministry	
A State - Owned Enterprise	
A private organisation / company	
A University / College	
Self – Employed	

Unemployed	
------------	--

8. Which country are you from?

.....

**Section B: RQ1 What is the nature of 4IR technology?**

9. Indicate to what extent your organisation makes use of the following 4IR modern technologies .  
 Using the scale ranging from '1' not at all to '5' to a greater extent). Tick the most appropriate box.

	1	2	3	4	5
Internet of things					
3D printing					
Robotics					
Artificial intelligence					
Block chain					
Data analytics					
Chat bots					
Process automation					

10. Please rate the nature of 4IR aspects applicable to your institution by ticking in the appropriate box. Rank as follows: **1. Strongly Disagree 2.Disagree 3.not sure 4. Agree 5. Strongly agree**

	1	2	3	4	5
I have heard about the Fourth Industrial Revolution (4IR)					
Accounting and auditing work are currently demanding new digital skills					

**Section C: RQ2 What are the required skills to utilise 4IR technology?**

11. Comment on the soft skills gaps of the young graduates joining your organization as far as Fourth Industrial Revolution is concerned. *Using the scale ranging from '1' very low level to '5' to veryhigh level. Tick the most appropriate box*

	1	2	3	4	5
Communication skills					
People management skills					
Coordinating others skills,					
Emotional intelligence skills ,					
Judgement and decision making skills					
Service orientation skills,					
Complex problem solving skills,					
Critical thinking skills					

12. Rate the technical skills gaps of the young graduates joining your organization as far as Fourth Industrial Revolution is concerned. *Using the scale ranging from '1' very low level to '5' to very high level). Tick the most appropriate box.*

	1	2	3	4	5
Understanding the capability of the software skills					
Analytical skills					
Data visualization skills					
Basic coding skills					
Fintech software knowledge					
Data security forensic tool skills					
Data warehouse management skills					
Enterprise resource planning skills					

13. Indicate level of skills an employee should possess to be able to work using the Fourth Industrial Revolution tools.

*Using the scale ranging from '1' very low level to '5' to very high level). Tick the most appropriate box.*

	1	2	3	4	5
Soft skills					
Technical skills					

Workforce readiness					
Entrepreneur skills					

Indicate any other skills: .....

.....

14. Indicate the level you are able to use the following Fourth Industrial Revolution tools. Using the scale ranging from '1' very low level to '5' to very high level). Tick the most appropriate box.

	1	2	3	4	5
Big data analytics					
Block chain technologies					
Machine learning					
Robotics					
Artificial intelligence					

What other 4IR tools do you use? .....

.....

**Section D: RQ3 To what extent is 4IR technology in use?**

15. Indicate your organisation's accounting IT hardware experience as follows: **1. Strongly Disagree** **2. Disagree** **3. not sure** **4. Agree** **5. Strongly agree**

	1	2	3	4	5
IT hardware infrastructure by corporations is able to complete all the transactions needed by the organisation like the preparation of financial statements.					
Most accounting systems in use have in-house IT hardware support services.					
Most companies are failing to outsource IT hardware infrastructure because of costs and non-available.					

The IT hardware infrastructure in use is reliable.					
--	--	--	--	--	--

16. Assessment of the software that is used by corporates. Rank your assessment as follows: **1. Strongly Disagree 2. Disagree 3. not sure 4. Agree 5. Strongly agree**

	1	2	3	4	5
Most corporates are using the appropriate software for their accounting functions.					
The software in use is reliable.					
The software is compatible with the banking systems in that service these corporates.					
The software is compatible with the requirements of tax authorities.					
The software packages are affordable to corporates.					

Indicate the names of the software you are using:

.....

.....

**Section E: RQ4 How do African accountants currently utilise 4IR to contribute to SDGs and Agenda 2063?**

17. Assess the contribution of 4IR to UN Sustainable Development Goals (SDGs) and Africa Agenda 2063. Rank your assessment as follows: **1. Strongly Disagree 2. Disagree 3. not sure 4. Agree 5. Strongly agree**

	1	2	3	4	5
4IR technologies adopted by accountants have improved the standard of living in my country.					
Technological innovations in the accounting field have reduced social marginalisation (gender, sex etc.) in my country.					
4IR technologies have enhanced equal access to financial resources by corporates.					

Other contributions of 4IR to UN SDGs and Africa Agenda 2063 are:

.....

.....

**Section F: RQ5 How has or how will 4IR affect the work of accountants in Africa?**

18. The following technological innovations have improved the role of accountants. *Indicate your level of agreement or disagreement as follows: 1. Strongly Disagree 2.Disagree 3.not sure 4. Agree 5. Strongly agree*

	1	2	3	4	5
Cloud computing					
Enterprise resource planning					
Forensic accounting					
Social media					
Taxation software innovations					
Artificial Intelligence and Machine Learning					
Internet of things					

What other technological innovations are you using? .....

.....

19. Please rate the importance of the 4IR aspects applicable to your organisation.

*1. Strongly Disagree 2.Disagree 3.not sure 4. Agree 5. Strongly agree*

	1	2	3	4	5
4IR pushes for the need for audit quality.					
4IR pushes for the need to reduce audit risk.					
4IR pushes for the need to promote audit innovation.					
4IR handles huge computational and routine tasks.					
4IR transforms work places					
4IR creates new jobs					
4IR requires adjustment of financial regulations and governance processes					

**Section G: RQ6 What needs to be done for African accountants to remain relevant in the 4IR era?**

20. Indicate the extent to which you agree or disagree with the following statements concerning 4IR.

Use the following scale: 1. Strongly disagree 2. Disagree 3. Not sure 4. Agree 5. Strongly agree

	1	2	3	4	5
Relevance of accountants in 4IR era is enhanced by continuous development.					
Availability of internet facilities enhances accountants' understanding of 4IR					

21. Rate the following statements in relation to the development of accountants to cope with the advent of 4IR on a five point scale, where, 1. Strongly disagree 2. Disagree 3. Not sure 4. Agree 5 strongly agree.

	1	2	3	4	5
Universities must offer continuous development activities for accountants					
Universities must transform their curricula to infuse the concepts of 4IR					
Accountants must team up with IT professionals to revolutionise their skills					
Training and refresher courses for Accounting staff in the organisation must be on-going (in-house training)					

22. Professional Accounting Organisation (PAOs) must offer continuous professional development programs that revolutionise accountants. Below are some of the key areas that accountants need to survive redundancy. On a scale of 1-5 indicate your choice where 1. Strongly disagree 2. Disagree 3. Not sure 4. Agree 5. Strongly agree

	1	2	3	4	5
Digital technology (cloud computing)					
Big data analysis					
Globalisation (e.g. outsourcing)					
Evolving regulations (e.g. tax regulation)					
New forms of corporate reporting					
Integrated reporting					
Carbon emission accounting					

In your opinion, what other 4IR topics should PAOs focus on during training and Continuous Professional Development sessions?

.....  
 .....

Thank you for participating in the study.

The end.



## APPENDIX 3: INTERVIEW GUIDE



Pan African Federation of Accountants (PAFA) and African Accounting & Finance Association (AAFA)



### AFRICA CALL FOR ACCOUNTING & FINANCE RESEARCH INITIATIVE (ACAFRI) 2020-2021

#### Dear Respondent

We are carrying out a research supported and funded by AAFA and PAFA on a topic entitled **“The Fourth Industrial Revolution (4IR): assessing readiness of the accountancy profession in Africa”**. The aim of this study is to get insights on the extent of use of 4IR technologies by African accountants to enhance their work. Results of this interview are intended to contribute to the knowledge on the readiness of accounting professionals in Africa to use 4IR and how that knowledge contributes to the African Union Agenda 2063 and Sustainable Development Goals (SDGs). Your participation in this research is voluntary. Confidentiality and anonymity of your contributions will be maintained. If you have any queries, questions or concerns about participating in this study, please contact the Lead Investigator at +263772410226 or [osifile@cut.ac.zw](mailto:osifile@cut.ac.zw).

Thank you in advance for your cooperation.

#### Skills to utilise 4th IR technologies

Which skills are needed to manage 4IR technologies?

Are accountants skilled enough to use the 4IR technologies? If NOT SKILLED or PARTIALLY SKILLED: Which skills do you think accountants need to have as they face the Fourth Industrial Revolution (4IR) technologies?

How good are Institutions of Higher Learning, Accounting Bodies, Employers (in house trainings) in imparting the skills accountants need to face the 4<sup>th</sup> Industrial Revolution Technologies?

### **Accountants and use of 4IR to create value and contribute to SDGs and African Agenda 2063**

With or without the use of the 4<sup>th</sup> Industrial Revolution Technologies, accounting can still be relevant and competent. What do you think?

Which 4IR Technologies are currently used by accountants?

Has the use of the 4<sup>th</sup> Industrial Revolution technology benefited the Accounting profession? How?

Do accountants wish to be exposed to more 4<sup>th</sup> Industrial Revolution Technologies? If YES, which ones? If NO, elaborate.

What restrictions (if any) are accountants facing in their attempt to expose themselves to 4IR technologies?

### **What needs to be done for accountants in Africa to remain relevant in 4<sup>th</sup> IR era?**

Without reskilling, will the work of accountants be threatened? Elaborate your answer?

What are the most important skills that accountants need to remain relevant?

What needs to be done by various stakeholders for accountants in to remain relevant?

Does the 4IR technology affect the education system in anyway? How?

How can the use of 4<sup>th</sup> Industrial Revolution technology be enhanced in teaching Accounting?

What should Africans accountants do to remain competent internationally?

**Thank you for your time.**

## BRIEF PROFILES OF RESEARCHERS

1. **Prof. Obert Sifile** – LEAD INVESTIGATOR: Works as the Finance Director and Part-time lecturer at Chinhoyi University of Technology, Zimbabwe, Department of Accounting and Finance. His contact details are [osifile@gmail.com](mailto:osifile@gmail.com) or [osifile@cut.ac.zw](mailto:osifile@cut.ac.zw). Office Phone: +263 67 21 27435, Cell: +263 772 410 226
2. **Dr. Daniel Twesige** is a lecturer at the University of Rwanda, College of Business and Economics, School of Business, Department of Accounting and is contacted at [twesiged@yahoo.com](mailto:twesiged@yahoo.com) Phone +250 784258777.
3. **Dr. Faustin Gasheja** is the Principal of the College of Business and Economics, University of Rwanda. His contact details are +250 788305615, E-mail: [Sheja777@gmail.com](mailto:Sheja777@gmail.com).
4. **Dr. Edson Gwangwava** is the Chairman of the Department of Accounting and Finance, Chinhoyi University of Technology, Zimbabwe and can be contacted or Email: [egwangwava@gmail.com](mailto:egwangwava@gmail.com) and Phones: +263 67 22203-5, +267 772587295.
5. **Dr. Shepard Makurumidze** is a lecturer at Chinhoyi University of Technology, Zimbabwe, Department of Accounting and Finance. His contacts are [t-smak70@gmail.com](mailto:t-smak70@gmail.com), Phones: +263 67 22203-5, +263 777899413.
6. **Dr. Kudzanai Matowanyika** is a lecturer at Chinhoyi University of Technology, Zimbabwe, Department of Accounting and Finance. He can be contacted at [kudzaimatowanyika@gmail.com](mailto:kudzaimatowanyika@gmail.com), Phones: +263 67 22203 5, +267 773735682.
7. **Mr. Shakemore Chinofunga** is the Executive Director of ICT at Chinhoyi University of Technology, Zimbabwe, and teaches part – time at the Department of Accounting and Finance. His contacts are [shakechinox@gmail.com](mailto:shakechinox@gmail.com) Phone: +263 67 22203-5, +267 778465001.
8. **Dr. Rangarirayi Mbizi** is a lecturer at Chinhoyi University of Technology, Zimbabwe, Department of Accounting and Finance. He can be contacted at [rangambizi@yahoo.co.uk](mailto:rangambizi@yahoo.co.uk), Phone +263 67 22203-5, +267 773984672.
9. **Mr. Kalisa Sunday** is a Director of Professional Development Services at the Institute of Certified Public Accountants of Rwanda (ICPAR). He can be contacted at +250 788302441, Email: [kalisasunday@gmail.com](mailto:kalisasunday@gmail.com).

**MENTOR: Prof. Venancio Tauringana**

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# THE FOURTH INDUSTRIAL REVOLUTION

*Assessing the Readiness of Accountancy Profession in Africa*



**Pan African Federation of Accountants (PAFA) and  
African Accounting & Finance Association (AAFA)**