Adaption of the Fourth Industrial Revolution in the Private Security subsector.

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EXECUTIVE SUMMARY

The Fourth Industrial Revolution has impacted lives due to digitisation and emerging of new technologies. These technologies include Internet of Thing, cloud computing, blockchain, industrial information integration and other related technologies. The purpose of this study was to understand the adoption of the revolution within the Private Security Subsector. The study further sought to investigate the positive and negative effects including required as a result of the 4IR. The research consisted of employers from private security companies. The study adopted an exploratory qualitative approach and where semi-structured interviews were used to collect data. Data was analysed using content analysis.

Overall, findings show that the 4IR has been able to increase productivity, access to online training which has been efficient, the ability to store huge data using cloud systems including personalised customer services. On the other hand, some employers expressed that they had no positive or negative effects concerning the evolution. The way of working has remained the same. Others stated that the 4IR has increased cyber security risks, struggling with the lack of skills from employees, cost of training and the consequences of loadshedding. The identified skills required in the private security subsector consist of, electronic surveillance, computer forensics expertise, drone pilots and cloud computing. Lastly, the study discovered a few emerging skills such as management systems, ICT technology, 5G technology, cyber security, and effective CCTV control systems.

Some of the recommendations from the study include employers need to capacitate their employees, funding for skills development, partnership with the Post school Education and SASSETA partnership Post school Education and Training.

Contents

List of acronyms

Acronyms	Description
AI	Artificial Intelligence
ATR	Annual Training Report
4IR	Fourth Industrial Revolution
5G	Fifth-generation wireless
IoT	Internet of Things
IT	information technology
NDP	National Development Plan
NSDP	National Skills Development Plan
PSET	Post School Education and Training
PSIRA	Private Security Industry Regulatory Authority
SASSETA	Safety and Security Sector Education and Training Authority
SETA	Sector Education and Training
SMEs	Small, Medium Enterprises
VR	Virtual Reality

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CHAPTER ONE
INTRODUCTION

1.1 Introduction

Technological development caused by the fourth industrial revolution (4IR) continues to shift the labour market. According to Bordas, 2022, 4IR develops environment in which technologies and trends such as the Internet of Things (IoT), robotics, Virtual Reality (VR), and Artificial Intelligence (AI) are changing the way people live and work. Such instances influence security service industry to adapt in the changing security environment in protecting their clients.

Private security services function primarily to protect the property, assets, information, and people (personnel and customers) of their clients, services include guarding services, private investigations, close protection, and retail (in-house) detectives (Kole, 2015). Olaitan, Issah, and Wayi (2021) argue that the emerging technologies under 4IR in developing countries would bring about increased production and service delivery, particularly of those products and services that are essential in contemporary society. However, Bordas (2022) mention that the biggest fears related to the new technologies is that the robots and the artificial intelligence may replace people in the workplace.

1.2 Background

The South African Security Industry is one of the third largest employer in the country with most services focused on the guarding sector (Schneider, 2012). The private security sector is very broad encompassing a large number of roles ranging from security guards and bodyguards to private reaction services and venue control (Tennant, 2020). Despite the growing importance and possible major impact of the 4IR on global economies, South Africa's challenges put it at risk of not being adequately for these evolutions, which is likely to have a consequential harmful impact on the economy and socio-economic system in the country (Putzier, 2017).

As the Private Security Industry continues to evolve, it has become important to ensure that certain standards of training are maintained whereby training becomes necessary for the more specialised services and electronic services (Tennant, 2020). Putzier (2017) highlights that security companies across all industries need to be actively and urgently investing in the reskilling of current workers as part of their transformation and future work caused by the 4IR. Nhede, Mazenda, and Masiya, (2022) suggests the need of action by the South African government and other organisations to implement advanced technologies and establish a workforce equipped with the skills to cater for the changing economic dynamics influenced by the 4IR.

Skill development plays an important part in increasing the demand of new skills caused by the 4IR. The aim this research is to investigate and understand the effects of this new evolution on the private security subsector are and make recommendations as well as the types of training required due to the changing nature of work. For employees to remain relevant with the prevailing way of life, they are required to continuously improve their capabilities through education, training, and development (Nhede, Mazenda, and Masiya, 2022). This will enable them to align their skills with new technology. Safety and Security Sector Education and Training Authority (SASSETA) should ensure quality provision of skills development within the subsector through effective and efficient partnerships.

1.3 Research problem

A major concern for South Africa is that it does not have adequate resources (skills and digital technologies) required for the successful adoption and utilisation of new technologies required for such a fourth industrial revolution driven economy in the private security industry (Olaitan, Issah, and Wayi, 2021). This indicates that one of the most intense impacts of the 4IR will be on the jobs people have and the skills that are necessary for success (Putzier, 2017).

1.4 Aim of the study

The aim of this study is to understand the effects of the fourth industrial revolution in the private security subsector.

1.5 Research objectives

- To understand how the fourth industrial revolution affected the private security subsector.
- To assess the skills required in the private security subsector as a result of the 4IR.

1.6 Research questions

- How has the fourth industrial revolution affected the private security subsector?
- which skills are required in the private security subsector as a result of the fourth industrial revolution?

1.7 Significance of the study

The general benefits of this research project will serve to add to the minimal existing body of knowledge on this topic specifically to the private security industry. Furthermore, It will serve to create a platform that can evaluate the skills required to employees with the changes that has occurred as a result of the Fourth Industrial Revolution.

1.8 Structure of the study

Chapter 1, **Introduction and background** introduces the Fourth Industrial Revolution (4IR), considers the challenges and concerns encountered, the problem statement. In addition, it indicates the research aim, objectives and questions plus significance of the study. Chapter

2, **Literature review** entails discussions around the legislative and policy framework, background of the 4IR, emerging technologies, an overview of the private security industry as well as the effects of 4IR.

Chapter 3, **Research design and methodology** contains the research design and methodologies used to collect data for this study. An exploratory research design was employed together with the qualitative research approach. Participants were recruited by the use of purposive sampling. Semi-structured interview occurred during the data collection process and analysed by content analysis. Moreover, discuss the limitations of the study and ethical considerations.

Chapter 4, **Key findings and discussion** provides a summary of the research findings gained from the questionnaire phase of the research. Lastly, the context-related theories of progress and sustainable development in the 4IR industry will be considered. Chapter 5, **Recommendations and conclusion** summarises the research findings and propose recommendations.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This section entails literature regarding the private security subsector and provides a background all four industrial revolutions. A literature review synthesizes research findings to show uncover areas in which more research is needed, and review issues identified with methodologies to make a good contribution (Synder,2019). In addition, this chapter discuss the emerging technologies, skills development including the effects of the fourth industrial revolution.

2.2. Legislative and policy framework

2.2.1 Private Security Industry Regulatory Act 56 of 2001

The core functions of PSIRA are listed in the Private Security Industry Regulations (PSIRA) Act (No. 56 of 2001) and primary objective is to regulate the private security industry (Schneider, 2012). The (PSIRA Act 56 of 2001registers security service providers applicants and issue them with identification certificates applying for court orders to set a code of conduct including investigate improper conduct by security service providers (Kole, 2015).

Berg and Gabi (2011) outline that training regulations are set out in the Security Officers Act 92 of 1987 Section 32 which addresses the purposes promoting training in the industry. The PSIRA Annual Performance Report 2021/22 stated its attempts to impact on the quality of training through its engagement with the Safety and Security Sector Education and Training Authority (SASSETA), which is a national training authority as established by the Skills Developments Act of 1998 (PSIRA,2010).

The agreement between PSIRA and SASSETA resulted in the alignment of the accredited courses in terms of the Training of Security Officers Regulations and the National Qualifications Framework-Registered Qualifications (Berg and Gabi, 2011). This means prior learning is recognised and it also formed the basis for training qualifications for all private security service providers.

2.2.2 Skills Development Act 97 of 1998

The Skills Development Act No.97 of 1998 purpose of the are to improve the quality of life of workers, work and labour mobility; to improve productivity in the workplace and to ensure the quality of education and training in the workplace (Terblanche, 2019). The Skill Development Act, 1998 (Act 97 of 1998) has led to the establishment of SETAs which are agencies responsible for implementing skills development and identifying priorities for skills development (Penxa, 2009).

The Skills Act emphasises the need to transform skills development through turning the workplace into a democratic environment; improving the quality significance of education and learning in the workplace since employers are often to hire unskilled people (Aigbavboa, Ayodeji, & Mokasha, 2016). It is imperative that implementing government supported skills development legislation would assist the training and up-skilling of employees to contribute to the actual development of skills in the labour market for social development and increased productivity particularly during the 4IR era.

2.2.3 National Skills Development Plan

According to the Department of Higher Education and Training (2019), the NSDP plan document aims to put in place the framework to build the capabilities citizens whereby outcome 4.2 highlights the importance of improving the level of skills in the South African workforce (DHET, 2019). The National Development Plan (NDP) mention several challenges consisting of; a critical shortage of skills, argued that skills development discourse for the current legislation has not addressed the skills needs of the South African economy.

The NDP 2030 already contains a strong vision for a future South Africa. “If the values and principles on which this vision is based underpin the 4IR, its technologies and tools can be harnessed in a myriad of ways to create a better, more inclusive, wealthier South Africa that benefits all its citizens” (DHET,2019:26). It is also argued that the skills development shortage is not addressed at the pace that is required by the fast-growing South African economy. The PSIRA (2022) annual performance plan highlights that due to the changing nature of competencies caused by the 4IR, the security industry will require the following changes:

- The need to train and upskill security service providers to meet 4IR requirements,
- The need to understand the changes in the security industry and develop strategies to regulate technologies within the private security industry.

2.2.4 White Paper for Post School Education and Training

Access to Post School Education and Training (PSET) should be a priority. It is important to ensure that the education and training opportunities where people have access caused by the changing world of work. The White Paper for PSET sets out strategies to expand the current provision of education and training in South Africa by improving its quality and to set out systems in which employers (private and public sectors) in the creation of a skilled labour force (Department of Higher Education and Training, 2013).

The 4IR has triggered new ways of working. New skills will be required to create, maintain, and leverage these new technologies. This will require the PSET system to partner with government departments and employers, to repurpose and reconfigure curricula considering lifelong learning and the need for a broader and more agile PSET system to respond to skills needs due to 4IR.

2.2.5 The National Cybersecurity Policy Framework for South Africa

Cybersecurity is a growing concern for governments due to the universal access to the Internet, social networks, growing digital government service and threats from terrorists and criminals. According to the State Security Agency (2015:14), “the purpose of the National Cybersecurity Policy Framework (NCPF) is to create a secure, dependable, reliable and trustworthy cyber environment that facilitates the protection of critical information and understanding of Cybersecurity in support of national security imperatives and the economy.” The NCPF tasks are aligned to the Department of Defence, which include, inter alia, addressing national security threats in cyber- space, combating cyber-warfare, cyber-crime, and trust in the secure use of information and communication technologies (Ntsaluba, 2018). Therefore, there is a need for building strategies to address South Africa's specific skills required to meet the increasing challenges of addressing Cybersecurity threats (The State Security Agency, 2015). This policy is also speaking to the challenges that stem from the 4IR which this study aims to address.

2.3 An overview of the private security industry in South Africa

Chauke (2007:5) describes the Private Security Industry as “the sector in which employers and employees are associated for the purpose of guarding or protecting a fixed property, premises, goods and persons”. According to Yorke-Smith (2010), most security companies in South Africa offer the following security services; guarding services; armed response; cash management services; electronic installers such as CCTV systems; electronic manufacturers and distributors; electronic fence close protection; event security; locksmith; security systems; and in-house security. The primary purpose of the security industry is to enhance the safety of persons and assets within a designated environment (Schneider, 2012). Kole, 2015 state that the South African Private Security Industry to the economy of the country in the following:

- It provides employment to thousands of people,
- It provides an opportunity for many people with a passion of becoming entrepreneurs and therefore attracts investors; and
- It renders protection services to assets and resources in the country.

In the past, the traditional concept of private security was limited to the services of patrol and security guards, mainly using manpower, or simple physical security activities using security cameras and fences (Naude 2017). However, many changes have occurred in the security industry, with the recent 4IR, they are particularly noticeable in the field of public security. Rymarczyk (2020) mentions that security companies are already using drones, search for elderly and protect critical facilities in order to deal with such changes and it plans to develop artificial intelligence police robots to use them for insufficient security personnel.

2.4 Background of Industrial revolution

The world has seen three different industrial revolutions that have taken place in the course of history. The global economy has passed through three major Industrial Revolutions. The 4IRst industrial revolution involved agricultural activities to the use of mechanisation which changed the means of production (Kayembe & Nel, 2019). The Second Industrial Revolution improved communication including the expansion electricity characterised by rapid industrialisation (Nhede, Mazenda, & Masiya, 2022).

The Third Industrial Revolution started came with the development in electronics, information technology (IT) and automated production (Olaitan, Issah, & Wayi, 2021). The 4IR is about the digital revolution happening at the current moment. Lastly, the 4IR characterised by the integration of new automation technologies with big data analytics creating new possibilities and opportunities for society (Kayembe& Nel, 2019).

2.4.1 The 4IR encompasses different emerging technologies

Table 1: Emerging technologies

Technology	Description
Artificial intelligence	Artificial intelligence is a system distinguishing complex patterns, processing information, drawing conclusions, and making decisions.
The Internet of Things (IoT)	This system of interrelated human-to-computer interaction is not limited to the security industry as they can communicate via the IoT to capture more innovative data.
Robotics	Robots are not only limited to big 4IRms but also contribute to massive output. Robots are machines designed to perform different tasks, automatically eliminating human error with speed and precision.
Big Data analytics	Decisions are based on accurate information, such as tracking hidden patterns and market trends and, most importantly, enabling customer preferences.
Fifth-generation wireless (5G)	The latest technology, high speed, and responsiveness of wireless networks to connect with other people worldwide.
Blockchains	Blockchains are convenient for using systems for international trade, such as including digital records of crop storage in warehouses available and secured before the selling point.

Drones	Drones are mostly handy, as they are uncrewed flying vehicles that are remotely controlled and available at different prices and sizes.
3D printing	3D printing involves the production of three-dimensional products from a digital file.

Source: Duckett et al (2018)

The evolution of technological intelligence information society, crime is increasing due to technological development such as the production of guns using 3D printing based on artificial intelligence (AI) and Internet of Things, the crime of violating intellectual property rights (Kayembe & Nel, 2019). SASSETA is required to identify scarce and critical skills for implementation through workplace-based training (Penxa, 2009).

The Skills development legislation mandates SASSETA to identify the need for skills in the Private Security Sub-sector. Therefore, the role of private security industry plays an important role in preventing such threats. The requirement of skills, for instance, technological skills are in demand as well as physical in the workplace. These changes will require employees to develop their existing skill sets at the expected level or acquire new ones. Companies also need to consider how work is organized within their organisations with the latest technological changes.

2.5 Fourth Industrial Revolution and skills development

There is a need for business to adopt new efficient and specialised techniques to increase production caused by the 4IR. The World Economic Forum (2017) recommends prioritisation of training and re-training of human resource to enable the workforce to remain relevant to the needs of the ever-changing work environment. (Naude 2017) state that essential skills need to match the latest technological transformation which would enable them not only to harness the opportunities but also to anticipate threats posed by the 4IR. A planned execution of training programs and managerial development programs is required to be undertaken to sharpen and enhance the skills, and to develop knowledge of employees.

Moreover, security officers need to operate efficiently and safely they need to undergo extensive training, build a base of knowledge and training structures should also include a system for maintaining and improving levels of competencies (Schneider, 2012). The World Economic Forum (2017) recommends partnerships with vocational training providers, governments and companies should develop and incentivize learning and training opportunities that can be used by current employees. This shows that skill development plays an important role in increasing productivity and adopting to new technologies. It assists employees to remain relevant with the continuous improvement of their capabilities through education and skills development.

The advanced technologies required employees who understand how they work, develop, and adapt to the new working environment. “It is expected that the fastest rise of advanced IT and programming skills which will grow by at least 80% in the next five years” (Balalle & Balalle, 2018:151). On the contrary, Balalle & Balalle (2018) also argue that some organizations have understood that the workplace skill levels of employees do not meet the needs of the rapidly changing business environment. It is critical to mention which skills are needed in current working environments, which skills will be required in the future and perform in the organization (Balalle & Balalle, 2018).

2.6 Effects of the Fourth Industrial Revolution

Rymarczyk (2020) mentions that the 4IR have costs, uncertainties, and threats such as; insufficient qualifications of employees, insufficient security of company data networks (threatened by cyber-attacks and industrial espionage), uncertainty of the economic effects which includes the utilisation of new machines, devices, and software. The 4IR will make way for new talents and skills as the emergence of new technologies would change the nature of work and human relations in production.

A major feature of 4IR is greater interconnectivity and data sharing. Heightened connectivity and availability of big data significantly increase the risk of cyber-attacks and theft (Bayode, van der Poll, & Ramphal, 2019). Essentially, the adoption of new technologies will increase the number of internet users in the country which may expose the country and its citizens to cyber-attacks (Olaitan, Issah, & Wayi, 2021). Hence, the private security industry should focus on adopting and utilising new technologies. Adams, Fourie, Marivate, & Plantinga (2020) advise that the use of biometrics, such as facial recognition technology can be reinforced.

Lack of financial resources is another major barrier to adopting new technologies, particularly for small to medium scale enterprises (SMEs) whereby business models to successfully adopt and implement the 4IR concept which may well require significant capital expenditure (Bayode, van der Poll, & Ramphal, 2019). On the other handemployees with medium qualifications cannot feel safe particularly those with low-skilled occupations. However, the demand will simultaneously increase for IT specialists, programmers, machine designers, software and hardware designers, supply chain designers, planners, robot operators (Rymarczyk, 2020).

Caluza (2022) stated that instead of training staff, security companies would rather retrench and approach security officers from other companies because training their officers would mean they would have to wait weeks for their officers to complete their training. Finances may be an issue preventing security companies from adopting the 4IR technology, however, security companies also short-change their security officers and businesses by not reinvesting in them by upskilling their workers and providing technologies to their workers. Security

companies get good contracts, but instead of investing in their security officers by advancing their skills and pay notch and exposing them to these new technologies, they would rather keep the money for themselves (Caluza, 2022).

According to Nhede, Mazenda & Masiya (2022), the likelihood of skills instability in South Africa is quite high and considering the emerging innovations and disruptive trends resulting from advanced technologies, there is a need for people to urgently acquire essential skills for the digital age. Creativity and innovation are also very important in this 4IR, given that there are high levels of competition in the provision of goods and services (Nhede, Mazenda & Masiya, 2022).

On the employment side, the employment rate of simple repetitive office workers and low-skilled workers is expected to decrease, while the demand for highly skilled workers is expected to increase, in particular, the technology sector related to the revolution (Kayembe & Nel, 2019). The researcher discovered that there are no sufficient studies conducted which provide an in-depth study focusing especially on how the fourth industrial revolution has impacted the private security subsector. More research is required to be done to identify the challenges, opportunities experienced, emerging technologies including skills required due to the changing nature of work.

2.7 Summary

This chapter had reviewed the legislative framework which consisted of; PSIRA Act 56 of 2001, the Skills Development Act including the NSDP. The 4IRst until the fourth industrial revolution were briefly discussed with the emerging technologies (AI, IoT, robotics, data analytics, 5G, drones and 3d printing). The 4IR also had an impact on the skills need due to the changing nature of work. Lastly, the 4IR effects comprised of the lack of financial resources, risks of cybercrime and the need for skills development and training.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The following chapter looks at the various research methodologies and research methods that are commonly when conducting a research study. Swedberg (2020) defines research methodology as methods and tools that are used during the research process in response to address the research objectives, research questions and research hypotheses of the study. This chapter focuses on the research design, research approach and procedures that are utilised. Furthermore, the chapter details of sampling techniques, the criteria used, describes the profiles of the participants, the data collection methods, data analysis and ethical considerations.

3.2 Research design

According to Meyer (2022), research design is a plan of the procedures that is used by researchers to collect and analyse the data needed by the manager, the purpose of any research design is to obtain evidence which addresses the research question and objectives.

The researcher employed the exploratory research design for this study. The purpose of exploratory research is to seek new insights and find out what is happening to ask questions and assess phenomena in a new light (Rahi, 2017). The purpose of an exploratory study may be (Swaraj, 2019):

i. To generate new ideas,
ii. To increase the researcher's familiarity with the problem or,
iii. To make a precise formulation of the problem or,
iv. To gather information for clarifying concepts or,
v. To determine whether it is feasible to attempt the study.

It is exploratory and seeks to explain 'how' and 'why' a particular social phenomenon, or program, operates as it does in a particular context. It tries to help us to understand the social world in which we live, and why things are the way they are. When a problem is broad and not specifically defined, the researchers use exploratory research as a beginning step. To provide insights and understanding. exploratory research is not intended to provide conclusive evidence but helps us to have a better understanding of the problem (Swaraj, 2019).

3.3 Research approach

Qualitative method is used to collect the in-depth details on a particular topic with the advantage of being interactive by allowing unexpected topics to emerge (Busetto, Wick, and Gumbinger, 2020). "It investigates local knowledge and understanding of a given program, people's experiences, meanings and relationships, and social processes and contextual

factors that marginalize a group of people" (Mohajan, p:2, 2018). The objective of qualitative research is to promote better self-understanding and increase insight into the human condition.

This technique of data collection focuses on collecting data from a relatively small number of respondents by asking questions and observing behaviour (Meyer, 2022). One advantage of qualitative methods in exploratory research is the use of open-ended questions and probing gives participants the opportunity to respond in their own words, rather than forcing them to choose from fixed responses (Moser and Korstjens, 2017).

Furthermore, qualitative research typically involves qualitative data such as data obtained through methods such as interviews, on-site observations, and focus groups that is in narrative rather than numerical form (Billups, 2019). Using qualitative interviews with employers from private security companies is one of the most useful for this study. Participants had the opportunity to respond more elaborately and in greater detail than is typically the case with quantitative methods.

However, the qualitative research method is limited in several respects. McGowan, Powell, and French (2020) mention one major limitation of qualitative research as the inability to use large samples representative of the targeted population. It can also be argued that the qualitative research method would be applicable for a smaller geographic coverage where the participants would be concentrated in that small geographic area, which is not the scenario in this study.

3.4 Sampling

Sampling refers to the process of selecting a portion of the population that conforms to a designated set of specifications to be studied (Rai and Thapa, 2015). Sharma (2017: 749) explains that "sampling is a technique (procedure or device) employed by a researcher to systematically select a relatively smaller number of representative items or individuals from a pre-defined population to serve as subjects (data source) for observation or experimentation as per objectives of his or her study". The sampling design is based on who will provide the best information to succeed for the objectives study in addition, focus on those people with the same opinion to have the required information and be willing of sharing it (Etikan, and Bala, 2017).

Non-probability Sampling is generally used in action research in which one studies a class without any generalization purpose (Pandey and Pandey, 2021). The researcher made use of purposive. Rai and Thapa (2015) mention that sampling purposive sampling discusses the selection of participants that will best help the researcher understand the problem, research questions including research objectives. In essence, a purposive sample is the one whose characteristics are defined for a purpose that is relevant to the study. SASSETA stakeholders

from the private security subsector were found to be the best source of rich and valuable information regarding their experiences concerning the fourth industrial revolution to address the research questions and objectives. A qualitative sampling plan describes how many interviews, focus group discussions or cases are needed to ensure that the findings will contribute rich data. (Etikan, and Bala, 2017). The researcher used the SASSETA Work Skills Plan (WSP) 2022 data dump to recruit participants and a total of thirteen participants were interviewed.

3.5 Data collection

The researcher has used a semi-structured interviews as the tool for data collection, because it provides participants with the opportunity to fully describe their experiences. Semi-structured interviews are characterized by open-ended questions with the use of an interview guide in which the broad areas of interest, sometimes including sub-questions (Busetto, Wick, and Gumbinger, 2020). It is rich and detailed information about affected populations.

Mohajan (2018) stated that interviews can be audio, video-taped, sometimes the interviewer can take written notes which may also be feasible. Interviews are most often carried out face to-face, though the use of telephone interviews to overcome geographical barriers (Barrett and Twycross, 2018:63). The telephone has grown in importance as an interview method, fuelled by the advantages of greater speed, convenience, and lower costs than face to face interviews (Tracy, 2019).

Semi-structured interviews were used whereby the interview questions were outlined. The questions were mostly open ended, making it possible for the interviewer to prob more questions during the interviewing process, depending on the responses of the participants. The guide assisted the researcher to pace the interview and makes interviewing more systematic and comprehensive. These interviews took about 15 to 25 minutes.

3.6 Data analysis

The analysis involves continually looking for patterns in the raw data collected in order to obtain an understanding of the culture under study.Content analysis is performed on forms of human communications; this may include permutations of written documents, photographs, film or video, and audiotapes . “Content analysis is a careful, detailed, systematic examination and interpretation of a particular body of material in an effort to identify patterns, themes, assumptions, and meanings” (Lune and Berg, 2017:182). The researcher followed the following steps in analysing raw data (Moser and Korstjens, 2018):

a) To obtain a sense of the whole, analysis starts with reading and rereading the data, looking at themes, emotions and the unexpected, considering,

b) You immerse yourself in the data. The most widely used procedure is to develop an inductive coding scheme based on actual data. This is a process of open coding, creating categories and abstraction,

c) The next step is to order similar or dissimilar categories into broader higher order categories. Each category is named using content-characteristic words,

d) During the analysis process, you identify 'missing analytical information' and you continue data collection. You reread, recode, reanalyse and re-collect data until your findings provide breadth and depth,

3.7 Limitations of the study

3.7.1 Availability of candidates

Most employers the researcher approached were not always available or could not attend pre-arranged an interview due to their work commitments. Others were not able to respond to emails in due time even after doing follow-up calls. Consequently, the Researcher had to be flexible, and in order to interview certain candidates, several dates had to be booked until the interview could finally be conducted.

3.7.2 Geographical difficulties

Approximately thirty percent of the interviewees are across different provinces, and it was logistically quite difficult to interview employer that were outside the Gauteng province. The Researcher unfortunately was not able to travel between in other provinces. Due to such constraints, the researchers conducted telephonic interviews and sent emails to the participants.

3.8 Ethical considerations

According to Rai and Thapa (2015), ethics refers to the quality of research procedures, regarding their adherence to professional, legal, and social obligations to the research participants. The purpose of ethical considerations in research is to ensure that participants' rights are maintained and are kept from being harmed and maintain participants identity.

3.8.1 Informed consent

The objectives of the study were explained to the participants, and their informed consent was obtained. Informed consent is a mechanism for ensuring that people understand what it means to participate in a particular research study so they can decide in a conscious, deliberate way whether they want to participate.

Individual informed consent may be written or oral. Lune and Berg (2017) describe that written consent means that a person receives a written form that describes the research and then signs that form to document his or her consent to participate. On the other hand, Oral consent means that a person receives all of the information needed for consent either verbally or in

writing however, the participant will verbally consent (Lune and Berg, 2017). In the context of this study, the researcher verbally provided information regarding the research study through telephonic semi-structured interviews then participants verbally consented.

3.8.2 Confidentiality and Anonymity

Mohajan (2018) communicate that confidentiality is an active attempt to remove from the research records any elements that might indicate the subjects' identities. In a literal sense, *anonymity* means that the subjects remain nameless. Confidentiality refers to handling the information concerning the respondents in a confidential manner. Respondents were assured that their names and the names of their companies will not be mentioned. The researcher assured participants that the information which they were going to provide would be treated in confidence. This was achieved by not using company name of the participants.

3.9 Summary

This chapter has outlined the research design, research approach, sampling strategy, including data collection tools, data collection and analysis methods. The research design for this study exploratory study that was analysed through qualitative methods. The next chapter provides the findings and analysis of the study.

CHAPTER FOUR
KEY FINDINGS AND ANALYSIS OF THE STUDY

4.1 Introduction

This study sought to investigate and gain an understanding of how the fourth industrial revolution has affected Private Security Sub-sector in South Africa including emerging skills required. This chapter entails responses from various employers within the private security companies gathered through semi-structured interviews. Based on the responses, this chapter will discuss researcher established the following findings and results pertaining to based then key research problem and sub-problems mentioned explicitly throughout this chapter.

4.2 Employers understanding about the Fourth Industrial Revolution

Before the study 4IRstly wanted to understand the participants perceptions of what they understood about the 4IR. Employers gave the following responses according to their understanding:

> *"The Fourth Industrial Revolution used computers, data, and IT to automate production through the rise of smart machines and the people who could program them."*
>
> *"This emerging technology innovation covers wide-ranging fields including but not limited to security, artificial intelligence, robotics, the internet of things (IoT), biotechnology, materials science, energy storage and quantum computing, to name a few."*
>
> *"I believe that it is the transition of how work is done. The Fourth Industrial Revolution includes using more technology in organisations."*

Many of these innovations are in their infancy, but they are already reaching an inflection point in their development as they build on and amplify each other in a fusion of technologies across the physical, digital and biological worlds. However, most participants expressed that they are not aware nor understand the concept of the 4IR. They did not fully understand this new evolution.

4.3 Effects of the fourth industrial revolution in the private security subsector

The Fourth Industrial Revolution is more than just technology-driven change, it is driven by innovation which has resulted in having a positive impact in various organisations however, it also has negative disruption in the safety and security sector.

4.3.1 Positive effects

I. Increased productivity

Safety and security are increasing concerns for businesses owing to the increased complexities of production systems that are being automated. This study discovered that some

organisations have experienced increased productivity coupled with, decreased costs through improved flexibility. Respondents explained:

> *"Wi-Fi cameras can use their biometrics to identify criminals and machine learning algorithms will use its data to anticipate where crime is more likely to happen.."*

> *"5G impacts the ability of Advanced Analytics from big data in the organisation. Advanced Analytics is key to growth, and it provides insight into an organisation's processes, operations, efficiency, and profitability. 5G has enhanced the business to efficiently access information relating to the organisation to identify issues, problems, trends, risks, and productivity." "The increased use of CCTV in the private security industry means that security officers would not have to walk for hours patrolling sites, they could monitor them from control rooms."*

> *"4IR will also make us more effectively reactive. Apps are allowing people to share their GPS coordinates with the police, community groups and private security with the press of a button so they can respond almost instantly. Emergency responders can then be directed to the user along the fastest, least congested route, massively reducing the time taken to arrive."*

New technology is making work more effective and efficient especially where these new technologies are concerned. With 4IR, digitalisation can process large amounts of data faster. Caluza (2022) highlights that mobile apps, security programs and software that are used using IoT, which security companies use for different security reasons such as access control and monitoring. These programs and apps have also made it cheaper for security companies to operate. It is no longer necessary for supervisors to drive to different sites (Bote, 2019).

II. Access to online training

Online or virtual courses has made training more accessible for employers to upskill their employees. An employer conveyed that:

> *"Due to the changes of technology, IoTs and digitalisation has assist us in training our staff without attending training courses physically. It has reduced face-to-face training costs, like travel, accommodation, and printing costs."*

Mhlanga (2021) stated that other important factors is that blended learning a variety of learning management systems and e-learning methods like webinars through Ms Teams, Zoom, use of blackboard. On the contrary, other companies struggle with ICT resources and do not have access to the internet, limited infrastructure, and electronic devices get affected by conducting virtual training. Workers being able to attend virtual training helps employers with additional costs that comes with attending in person training.

III. Cloud technology

Putzier (2017) defines cloud technology as the provision of a computer service or application via the internet or a network which needed IT resources for computation or storage. Moreover, cloud computing additionally facilitates the rapid advancement of internet-based services,

from online and offline storage information (Putzier, 2017). Technology has made it easier organisations for store their large documents and records online.

Other participants mention how access to digitalisation and the IoT has improved their electronic filing system which keeps their documents safe. They further explained that people are able to access the files outside the offices. Moreover, it was expressed that it also reduces the cost of labour as well as keeps the offices environment clean.

IV. Safer streets

4IR is also in the form of CCTV cameras that proactively detect suspicious vehicles and alert nearby armed response. Communal Wi-Fi cameras will identify criminals by their biometrics before they even commit their next crime, and machine learning will use data to predict when and where crime is most likely to happen (Botha, 2021). For instance, one participant mentioned:

> *"The Durban Municipality had plans to become a safer city with the focus being on the Durban Beach Front. Being a safer city by monitoring people's movements captured by CCTV, making it possible to track them if they were to go missing. The biggest benefit of the CCTVs is that they act as a deterrence to crime and if security officers were to identify any suspicious activity in the control room, they could easily dispatch a response team to the area."*

The 4IR has implemented AI and the IoT in the use of CCTVs. Kole (2015) brings to light that the automation process enabled by IoT makes it possible for the cameras to record and store data on servers and Cloud. Likewise, IoT also makes it possible for end users to monitor CCTVs on their phones. This has changed the face of control rooms in the industry (Kole,2015). According to Ntsaluba (2018), the increased use of CCTV in the private security industry would mean that security officers would not have to walk for hours patrolling sites, they could monitor them from control rooms.

4.3.2 Negative effects

I. Cybersecurity risk

Employers were aware and concerned of cyber security problems. There are threats from spams and well organised attacks intended to corrupt or disable systems organisations used to store their huge records online.

> *"As an organisation, we need to map our networks, assessing the risk and critical factors relating to security. Such an assessment should examine accessibility to systems, such as possible threats from internal sources, from disgruntled employees to internal human error, and external sources including hackers and cyber terrorists."*

The fourth industrial revolution needs stronger cybersecurity structures. Sutherland highlights that cybersecurity presents problems, with the need for skilled individuals in the defence and security sectors, in critical national infrastructure and across all sectors. When everything is connected, the risk of hacking data and tampering with it or using it for malicious intent is now more prevalent. A major feature of the fourth Industrial revolution is about interconnectivity and data sharing. Naturally, such enhanced connectivity and availability of big data would significantly increase the risks of cyber-attacks and theft.

Bote (2019) mentions that the NCPF takes cognisance of the fact that cyber threats and attacks hence, the NCPF is aware of the possibilities of organisations being compromised from the cyber domain. The need to develop the skills enables the cybersecurity culture, and this can be achieved by the development of accredited programmes to be implemented in collaboration with the SETAs and The Quality Council for Trades and Occupations (QCTO) (Ntsaluba, 2018).

II. Lack of skills

The researcher identified that majority of employers were concerned about the need ICT skills is the area employees should be upskilled on. The concern is that organisations still lack the requisite technical skills and resources to adapt to this ever-changing technical environment.

Some respondents specified as follows:

> *"Lack skills to use Personal Computer devices. SASSETA GPS NQF 3 qualification may assist to bridge the gap, because computer course is one of the unit standards."*

> *"Low numbers of employees with basic computer literacy even though some do have computer certificates. So those are able to get work done."*

The evolving working environment, the anticipated future employment trends and needs in terms of the knowledge and skills required to adapt becomes even more critical for all stakeholders. Mhlanga (2021) stated that digital literacy is the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills.

Conversely, other employees disclosed:

> *"They feel intimated by using a computer. They are comfortable with simple basic skills most of them. They do not want to study further to improve skills in terms of 4IR, this complicates things. The thing is when you want to create opportunities for them to use their skills they refuse."*

The uncertainty surrounding the development and adoption of emerging technologies may mean that there is no clear understanding of how the transformations driven by industrial

revolution. Now, the question is, how to go about upskilling in your organization? This can be done in various ways by employers. To build skills which will help companies adapt into the 4th Industrial Revolution, it's vital to determine the training methods that would work best for them and their team. It may include online skills training, in-person team training, and short-courses that train for technical skills.

III. Costs of training

This study discovered that the 4IR has brought about the need for new skills as a result, security companies need to reskill their employees. Both (2021) emphasizes that the technological advancements often associated with the 4IR will impact ability to access training. Most respondents communicated the need for funding to be able to train their employees. Participants had an issue of the costs required to upskill staff members. The cost of integrating the technology is a lot to staff have to be trained to use the technology. As automation substitutes for labour across the entire economy. Just the costs, especially during the unfavourable economic conditions. Smaller companies are struggling with competing for work because they could not afford these new technologies including developing their staff members, security companies with more financial muscle are already adopting the technology introduced by the 4IR (Caluza, 2022).

IV. Effects of loadshedding

South Africa is currently experiencing an electricity crisis. The persistent loadshedding disrupts businesses and compromises the provision of social services such community safety amongst other social issues. The power outages affect the level security for organisations. Other stated that:

> *"Loadshedding makes it difficult to access our online systems. It decreases our staffs productivity since time is lost during the hours when there is no electricity."*
>
> *"Wi-Fi is a basic need our business and as it relies on a power supply to operate. When we aren't able to log onto our network, this prohibits access to emails, digital systems (i.e. logistic management systems), and affects basic communications with clients."*
>
> *"Sensormatic and CCTV systems being offline and decreased lighting within makes companies more vulnerable to external criminals."*

In essence, security is compromised whereby shoplifting, compromised digital systems and shutdown 4IRewalls security turns off with power. Hence, this leaves businesses vulnerable to all sorts of attacks and can even increase required insurance cover. If a business is able to afford the capital to provide backup generation power and operational costs associated with loadshedding. The more a generator needs to run, the more maintenance that is required. The

existing power generation infrastructure are dated, inefficient, and poorly maintained and as a result during times of increasing demand, load shedding is often implemented (Bayode, van der Poll, and Ramphal, 2019).

4.4 Skills are required as a result of the fourth industrial revolution

Skills disruption means that employees need to maintain momentum through continuous training of hard and soft skills to survive the impact of the 4IR.

Table 2: Technical skills need as a result of the Fourth Industrial Revolution

Technical skills	Description
Electronic surveillance	This needs skilled individuals to have computer skills and digital experience in regards to advanced private investigation.
Computer forensics	These skills assists to reinforce security defences in protecting new and existing cybersecurity threats.
Alarm Technicians	Employees need skills such as wiring and advanced access control
Drone Pilot (drone technology)	Security surveillance industry including CCTV cameras, offsite monitoring, access control.
Basic computer	There is a demand that security officers is becoming essential to have computer skills.
Automated Access Control skills	ICT skills for security officers
Computerised Security Supervision	e.g., Database Management to Manage Arrests made. Education & Training Management Software, Cyber Security for security companies
Cloud computing	This is a system that backs up data files, it's important to have skills that will help to understand how to use and adapt to using cloud platforms

Source: Author, 2023

Table 2 shows the technical skills employers requires because of the fourth industrial revolution. These are the skills they need to train their staff. The above indicates the growing necessity to focus on developing human capital as well as competencies and digital skills because without them one cannot implement the advanced technologies.

Additionally, other employers added:

> "We had 2 x Alarm Technicians as qualified IT graduates when they left the company suffered. We are trying to find skilled Alarm technicians. However, we are struggling to find them. The ones we have trained found a job in the public sector. We have to train them all over again, technicians are scarce."

> "We need a SAQA qualification up to NQF 6/7 Diploma in Security Management. WITS university offers great programmes for security industry. We need similar qualification with similar parity of esteem from SASSETA".

At the most basic level, employees in most roles will be required to access data and determine how to act on it. This requires some technical skills. Due to the speed of change in the future workplace, people will have to be alert and able to adapt to change. It needs flexibility but also be able to adapt as mandatory to adjust to shifting workplaces, expectations, and skill sets. An essential skill during the 4th industrial revolution will be the ability to see change not as a burden but as an opportunity to grow. For an example, the use of drones in the guarding sector has to some degree led to job losses because with a drone you can half your staff complement. However, this also lies with the owner of the company as to whether they are willing to upskill their workers with the right skills for the drone to be used as a compliment to the work that they are doing instead of the drone being a substitute (Caluza, 2022).

Table 3: Soft skills need as a result of the Fourth Industrial Revolution

Soft skills	Description
Communication skills	People must be learn to effectively share ideas and lead others without any misinterpretation as well as good listening skills.
Complex Problem Solving	With new technology existing and emerging, it is a desired critical skill. It involves the ability to consider the scope of issues, impact of the problem, resources needed and being able to provide potential solutions.
Emotional Intelligence	emotional intelligence is the vital foundation for skills critical such as self-awareness, self-regulation, motivation, empathy, and social skills.
Critical Thinking	This will require employees to analysis plus assess developments of company processes and client needs.
People Management	People within the organisation still work in teams and deal with clients therefore, it is important for individuals to be able to work with others.

Source: Author, 2023

Table 3 presents the soft skills needed during the fourth industrial revolution. Findings reveal that as much as technical skills are in demand however, most companies highlighted the importance of soft skills as well because they still deal with clients and teams on a daily basis. There are skills required that the new technologies are unable to replicate. These skills

include; complex problem solving, critical thinking, creativity, people management, coordinating with others, emotional intelligence, judgement and decision-making, service orientation, negotiation and cognitive flexibility (Gray 2016). Cognitive skills and their ability to think out-of-the-box, plus creativity and innovation are also very important in this 4IR. Hence, skills like effective communication, emotional intelligence, critical thinking and people management skills. For employees to remain relevant to the changing nature of work, they are required to continuously improve their capabilities through education, training, and development. This will enable them to align their skills with new technology.

4.5 Type of training implemented in the subsector as a result of the 4IR.

Digital technologies are beginning to facilitate skills development in new ways, leading to a focus on the development of competent individuals. Results of the study of some of the training initiatives that were implemented in a few security companies.

The list of implemented programmes:

- Alarms system training
- Cloud computing
- Cyber security training
- Technicians
- Artificial intelligence training

The nature of science and innovation is also changing significantly. For example, the use of big data, AI, interconnected networks, and high-speed computing could lead to new discoveries, create technology, and bring it into production requiring specialized human capital (Bikse, Grinevica, Rivza, and Rivza, 2022).

4.6 Emerging technologies in your organisation

The fast technological changes determine the needed changes in higher education and training for responding to the new and changing world. Digital technologies are beginning to facilitate skilled human capital development in new ways, leading to a focus on the development of competent individuals (Bikse, Grinevica, Rivza, and Rivza, 2022). The challenge lies within the managing these transformations to ensure good jobs and improved productivity. If the transformations is not managed wisely, the 4IR poses the risk of widening skills gaps.

The researcher discovered the following emerging technologies mentioned by stakeholders within the private security subsector:

- Management System

- ICT Technology
- 5G Technology
- Cloud Technology
- Cyber Security
- Effective CCTV control room

Some participants elaborated further the following:

> *"Cybersecurity needs to be implemented whereby networks are protected by impenetrable wall made up of 4IRewalls, VPNs/VLANs, airgaps, software-defined networks, and other technologies. However, a single breach can result in the entire network being compromised."*

> *"Customers and end users are demanding transparency around how tech is used and how data is managed, especially with increased surveillance. This, together with the need to maintain privacy, will be a key challenge."*

This means that advanced technologies impose high demands on people's education, their professionalism and competences; demand is emerging for all people to build up employability and digital competences/skills in order to be able to learn and implement new technologies. Skilled personnel are a requisite to operate or work with the advanced and/or emerging technology in 4IR. The 5G technology connectivity also plays a significant role in this digital revolution. 5G will impact 4IR in a big way as it enhances connectivity and data processing capabilities by offering high-speed transmissions, more coverage and bandwidth.

According to Xu, David, and Kim (2018), having everything attached to everything else in the IoT is going to intensely increase the vulnerabilities present in any given network. Furthermore, connections and burden of connectivity, systems are going to have to be more secure (Xu, David, and Kim, 2018). In such a rapidly evolving working environment, the ability to anticipate future skills and employment trends becomes even more critical for all stakeholders in determining future education and training investment. For employees to remain relevant with the prevailing way of life, they are required to continuously improve their capabilities through education, training and development. This will help them to align their skills with new technology.

4.8 Summary

This chapter presented an analysis and discussion on the findings of the study in addressing the research objectives. The positive and negative effects were discovered within the safety and security sector. A few opportunities identified as well as the skills need and emerging technology.

CHAPTER FIVE

RECOMMENDATIONS

5.1 Introduction

The purpose of this chapter is to present a summary of key findings of the study, recommendations, and conclusion. The recommendations focus on the effects of the 4IR has on the private security subsector and potential way to address skills development skills for existing and emerging skills.

5.2 Summary of research findings

The purpose of this study was to investigate and understand how the 4IR has impacted the private security industry. The study was able to achieve objective as follows:

Objective 1: To understand the fourth industrial revolution affects the private security subsector.

The findings of the study looked at the perception employers had understood what is meant by the concept of 4IR. 4IRstly, the researcher identified that only a few participants had an idea and knowledge able this evolution whereas most employers are most as not informed of have the adequate knowledge of what is 4IR. The researcher had to explain to participants the idea of what it constitutes therefore, about to proceed with the questions. This study identified the positive effects of the 4IR in the subsector consisted of; increased productivity since new technology has made employers more effective and efficient in performing their duties.

Additionally, it has provided the access to online/virtual training like ICT and relevant skills development programmes which is cost effective for their businesses. Findings also uncovered that cloud technology has improved their filing system by the use of electronic filing system containing large data including the ability to access work remotely. The negative effects encountered by employers entailed being exposed to high risks of cybersecurity attacks, the need upskills workers, the need for funding to train employees and the impact loadshedding has on the 4IR.

Objective 2: To assess the skills required in the private security subsector as a result of the 4IR.

The study has also discovered that the 4IR influenced the skills needs for certain private security companies. There is a demand of increasing technical skills requirements. These technical skills consist of electronic surveillance, ICT skills, computer forensics and cloud computing. Additionally, soft skills are still important for employers. Employees need to have complex problem-solving skills for them to be able to identify complex problems and review

related information, to develop, evaluate options and implement solutions in the mist of the 4IR. Although not all jobs can be replaced, a new set of skills should be developed to keep up with the new skill requirements.

5.3 Recommendations

Recommendation 1: Employers need to capacitate their employees

The researcher identified the need of training programmes particularly in ICT competencies and other technical skills for the digital era. Furthermore, the revealed that cybercrime is that another biggest challenged caused by the fourth industrial revolution in the safety and security sector. The study recommends that organisations need equip their ICT department or outsource cybersecurity practitioners to help users to identify and prevent cyber-attacks. To achieve this, SASSETA should offer skills intervention programmes to address advance skills development in ICT.

Recommendation 2: Funding for Skills Development training.

The results of this study also recognised that some private security companies do not have enough funds to train their staff for new skills set. Private security companies are SASSETA stakeholders, they can request training intervention programmes with the SETA. SASSETA should invest more funds in assisting employers to reskills their employees in the form of discretionary grants for relevant skills development projects can be obtained by employers. An investment in education and training to address shortages of key technical skills should be made.

Recommendation 3: SASSETA partnership Post school Education and Training.

A strong core of education and training programmes should be aligned with changing world of work in the context of the 4IR. SASSETA needs to enhance their partnerships with the PSET system to improve the responsiveness of skills training interventions in the sector. There is an emphasises the integrating into PSET programmes and courses learning opportunities that prepare people to be able to cope with accelerating change. This is a joint responsibility that requires the active engagement and support of the SASSETA.

5.4 Conclusion

This study has provided information through which to gain an understanding of the implementation of the legislative framework for skill development in the private security sub-sector of the safety and security sector in South Africa. It is also clear that the Private Security Industry sector, over the three years that were studied, effectively implemented skills development policies. Much has been achieved by the sector in terms of the implementation of legislation. However, undoubtedly, there are some problems and challenges in meeting some of the critical targets, but there are some indications that the implementation of

recommended strategies may provide an effective vehicle for improvement and for addressing the challenges.

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