

**BUSINESS MANAGERS' KNOWLEDGE AND LEADERSHIP BEHAVIOUR IN
RELATION TO ARTIFICIAL INTELLIGENCE IN NELSON MANDELA BAY**

18006420

Research Methodology

RESM8412p

IIE Bachelor of Commerce Honours: Management

Carole Baldie

I hereby declare that the Research Report submitted for the IIE Bachelor of Commerce Honours: Management degree to The Independent Institute of Education is my own work and has not previously been submitted to another University or Higher Education Institution for degree purposes.

Signed: _____

Word Count: 8996

ABSTRACT:

South Africa is in an interesting situation, whereby the country needs to make an important decision; does the country embrace, manage and assist in developing the Fourth Industrial Revolution (Industry 4.0). Artificial intelligence (AI) is a key driver of Industry 4.0, and invaluable for knowledge management in terms of data storage, management and dissemination. The processes required for AI development and its' embracement is largely dependent on leadership behaviour in South Africa and the world. This study has focussed on the leadership behaviour and knowledge of business managers in Nelson Mandela Bay (NMB) with regards to AI, and how AI is able to assist knowledge management within organisations. This research report implemented a combination of purposive, convenience and snowball sampling, due to specific constraints. The data was collected and interpreted from 25 business managers, utilising descriptive statistics. AI is the main concept of evaluation when Industry 4.0 is discussed. This research report has indicated that the sample of business managers would trust AI in certain circumstances, however, their leadership behaviour towards AI is sceptical, and they have a knowledge gap. The research also indicated that employees do have opportunities to develop their skills.

Keywords: Leadership Behaviour, Business Manager, Artificial Intelligence, Industry 4.0, Knowledge Management, Service Industry.

Table of Contents:

1	Introduction and Contextualisation	1
1.1	Relevance and Rationale	2
1.2	Problem Statement.....	3
1.3	Purpose Statement.....	3
1.4	Research Question.....	4
1.4.1	Sub Questions	4
1.5	Objectives	4
2	The Conceptualisation of Key Terms.....	5
3	Literature Review	6
3.1	Theoretical Foundation.....	6
3.2	The Influence of Leaders and Leadership	8
3.3	Artificial Intelligence.....	10
3.4	The Importance of Reskilling and Upskilling	12
3.5	Knowledge Management.....	13
4	Research Methodology	15
4.1	Research Design and Paradigm	15
4.2	Population and Sampling	16
4.3	Data Collection and Analysis	17
5	Findings and Interpretation of Findings	19
5.1	Interpretation of Findings and Association with Literature	19
5.2	Summary of Key Findings	24
5.3	Validity and Reliability	25
6	Conclusion.....	26
6.1	Discussion of Research Questions.....	26
6.2	Heuristic Value and Implications for Future Research	27

6.3 Ethical Considerations	29
6.4 Limitations of the Research	30
7 References	a
Annexure A: Final Research Report Summary Document	d
Annexure B: Leadership and Artificial Intelligence (Survey)	e
Annexure C: Ethics Clearance Letter	f

Table of Tables:

Table 1: Key Concepts	5
Table 2: Drivers of Change in South Africa, 2015-2020 (WEF, 2017:8)	7
Table 3: Summary of Key Findings	24

Table of Figures:

Figure 1: The AI Growth Model (Purdy and Daugherty, 2017:9)	10
Figure 2: Service Industry	19
Figure 3: Trust Advice from AI	20
Figure 4: Skills Development of Employees from Organisations	21
Figure 6: Likert Scale Question Means	22
Figure 5: Managers Comfortable with AI Monitoring and Evaluating their Work	22
Figure 7: Knowledge of Managers	23

1 INTRODUCTION AND CONTEXTUALISATION

Adopting new technologies, such as AI, could be detrimental to organisational success (Moldenhauer and Londt, 2018:159-160). Previous Industrial Revolutions have had a significant impact on increasing social inequality and changing the work environment for employees. Countries should at least have the capabilities to absorb new technologies, otherwise, the countries will not be able to obtain value from Industry 4.0, and intensify social inequality further (Schwab and Davis, 2018:13-14 & 53-54).

The knowledge of leaders and the subsequent acceptance of new technologies should be a priority. Leaders should remain educated and create a competitive edge for the organisations they work for, based on novel technologies (Moldenhauer and Londt, 2018:159-160). Empowerment is an important characteristic with regards to leadership behaviour from business managers (Schwab and Davis, 2018:14-15). Dhir (2019:20) agrees, adding that leadership research focuses on the adaptability of leaders, and how leaders, rather than managers, are needed. The term "leader", rather than "manager", is readily used in modern organisations. Walczak (2016:1) states that a manager should always aim to achieve organisational objectives, and one of these objectives is knowledge management.

Xing, Marwala, and Marwala (2018:171-172) indicate that AI is a component of Industry 4.0. Industry 4.0, a data resource, works in concomitant with human, capital and natural resources to embody production resources. Galloway-Gaul (2019) explains that AI is software which does not need to be programmed to perform tasks. AI learns and subsequently performs tasks autonomously or through human augmentation. AI could be to the detriment of employees, Artley (2018) describes that developments of Industry 4.0 have eased the workload for employees but has also caused the retrenching of employees.

Investment into and acceptance of AI is unavoidable and should be adopted by business managers to simplify and improve managerial decision-making and time management. Leaders should be able to utilise AI appropriately to improve knowledge management processes (Walczak, 2016:2-3). Dhir (2019:18-19) states that AI provides organisations with an opportunity to further develop their workforce. Internal organisational research is popularising in organisations, and the usefulness of employees are being determined by the cross-functional knowledge they possess. Moscoso-Zea, Castro, Paredes-Gualtor, and Luján-Mora (2019:38780) argue that knowledge is crucial to store and manage within an organisation. Knowledge is often difficult to reprocess to another organisation, due to its

culture and stakeholders. This section will continue by discussing the relevance and rationale of this research report.

1.1 Relevance and Rationale

The research rationale should explain why the research should be conducted, and why it is important to conduct research (Maree, 2016:30). Davis (2016) suggests that research is concomitant with innovation, investment and widespread acceptance is dictating developments in Industry 4.0. The evolution of Industry 4.0 is based on populism. Marcouse, Anderson, Black, Machin, and Watson (2014:57) state that an increased number of jobs are becoming automated, and that businesses should be aware of this global trend. Artley (2018) indicates that companies have already retrenched employees due to automation due to the affordability and efficiency of AI.

Xing, et al., (2018:173) indicate that the advent of Industry 4.0 and AI is a cause of uncertainty due to possible job losses. In order to neutralise possible job losses, the workforce should educate themselves with regards to Industry 4.0, AI and knowledge management. Barnes and Milton (2014:179) state that knowledge management in an organisation should be coached to upskill employees. Liebowitz (2001:5) implies that storing knowledge is required from upskilled employees to assist in teaching unskilled employees' the necessary skills for their specific job. Moldenhauer and Londt (2018:159) describe that AI can assist in upskilling employees and the processing of knowledge through an integrated AI-knowledge management system.

The advent of Industry 4.0 may "leapfrog" previous Industrial Revolutions. For example, AI technology may already be available in developing economies, however, many of these economies may not have access to sanitation facilities, which is a segment of the second Industrial Revolution (Davis, 2016). Schwab and Davis (2018:50-51) argues that electricity in homes (also from the Second Industrial Revolution) have increased leisure time for stay-at-home wives, changed family structures and reallocated time for people to invest in other activities. This may have a duplicate effect for Industry 4.0. For example, Managers spend more than 50% of their work time on administration. "86%" of these managers would prefer AI to do most of the administrative work, which would free up time for managers to focus on strategic decision-making (Kolbjørnsrud, Amico, and Thomas, 2016:3-5).

1.2 Problem Statement

Moldenhauer and Londt (2018:155 & 157) suggest that AI, a driving factor for Industry 4.0, has and will continue to create new paradigms of work. Leaders need to have the capabilities to adapt to this paradigm, and therefore additional skills development is required for new and existing jobs. AI is capable of improving the service industry in South Africa, however, high unemployment hinders the development of AI due to the uncertainty it creates regarding employment.

Davies (2018) states that the manifestation of Industry 4.0 is better experienced in developed economies, compared to lesser developed economies like South Africa. Schwab and Davis (2018:53) argue that institutional reform and absorptive capacity of technologies is required. For example, the third Industrial Revolution enhanced the digital infrastructure of developing economies and allowed readily available and affordable mobile phones for those countries. Moldenhauer and Londt (2018:155-57) indicates that the future economic growth and development in South Africa depends on the knowledge of AI from leaders, and how willing these leaders are in embracing Industry 4.0.

1.3 Purpose Statement

Moldenhauer and Londt (2018:155-57) explain that researching the effects of AI is important for service delivery because business leaders will be liable for the development and acceptance in South Africa. Schwab and Davis (2018:49-50) argue that developments in Industry 4.0 require input from all stakeholders to emphasise societal inclusivity.

This research will focus on the current leadership behaviour and knowledge of AI of NMB business managers in the service industry (tertiary sector). Presently, scepticism regarding AI implementation in business exists from higher-level managers (HLM), which is why research will be conducted by distinguishing between HLM and first-line managers (FLM) (Kolbjørnsrud, Amico, and Thomas, 2017:37-38).

1.4 Research Question

- Do current Nelson Mandela Bay business managers embrace artificial intelligence in relation to leadership behaviour?

1.4.1 Sub Questions

- Do Nelson Mandela Bay business managers understand the benefits of artificial intelligence?
- Do higher-level managers embrace artificial intelligence more than first-line managers?

1.5 Objectives

- The first objective of this study is to examine whether business managers in NMB believe they understand the benefits with regards to AI?
- The second objective is to compare the leadership behaviour of FLMS and HLMS with regards to AI and its embracement, acceptance and knowledge thereof.

The conceptualisation of key terms is the next section, before exploring the most significant literature for this research report.

2 THE CONCEPTUALISATION OF KEY TERMS

The key concepts of a study provide the guidelines for definitions of concepts that are important for a specific research study (Maree, 2016:32). A concept of a study adds value to the study and its definition is determined by the study. These different concepts of a study create the study's construct. This process in research is called conceptualisation (Du Plooy-Cilliers, et al., 2014:107-109). The key concepts of this study are listed and defined in "Table 1" below, and is supported by du Plooy-Cilliers, et al., (2014:38), by means of the scholarly theory.

Table 1: Key Concepts	
Leadership Behaviour	The behaviour of a leader is determined by how the leader leads and the actions of the leader (Nel and De Beer, 2018:59).
Business Manager	To achieve organisational goals, a business manager should be able to plan and organise processes, as well as effectively communicate and motivate employees to assist them in achieving their daily goals, so that the goals of the organisation can be achieved (Nel and De Beer, 2018:32).
Artificial Intelligence (AI)	AI can be hardware and/or software that works both independently or dependently of humans in order to complete a task which is considered intelligent if a human is able to replicate the same task (Moursund, 2006:2).
Fourth Industrial Revolution (Industry 4.0)	Davis (2016) defines Industry 4.0 as the integration of society and "cyber-physical systems", such as AI, which relies on the Third Industrial Revolution (digital systems, electronics and automation).
Knowledge Management	Liebowitz (2001:1) defines knowledge management as the management of knowledge within a company and the stakeholders, whereas AI is a factor which influences the effectiveness of knowledge management.
The Service Industry	Cambridge University Press (2019) defines service industry as followed; "an industry that provides a service for people but does not result in the production of goods".

3 LITERATURE REVIEW

Walczak (2016:1-2) states that managers have an array of tasks which may include; leadership practice and knowledge management. A manager could range from a FLM (operational roles) to higher-level executives. Kolbjørnsrud, et al., (2016:4-5) explains that AI has the capabilities to assist in decision-making processes. AI may be useful and could be integrated into the business decision-making process. However, problems that arise from the business culture or which require emotional intelligence still requires leadership guidance and experience. Employees should be open and knowledgeable about accepting and utilising / to enhance decision-making. Moldenhauer and Londt (2018:155) agrees that leaders should welcome AI, because leaders are the drivers for developments of Industry 4.0, and subsequently the acceptance thereof. Knowledge and openness toward Industry 4.0 contribute to the acceptance and widespread use of AI. This section will discuss the relevant literature regarding leadership, AI, and knowledge management.

3.1 Theoretical Foundation

Both leadership and AI improve knowledge management within an organisation (Moldenhauer and Londt, 2018:157-158). Leadership, AI and knowledge management are key concepts in this research. This association will be supported by the “scholarly theory”. This theory follows a sequential research flow. The research should have appropriate and interrelated concepts to form a construct (Du Plooy-Cilliers, et al., 2014:38-39). For example, AI could be perceived as one of the concepts which create the construct of Industry 4.0 (Davis, 2016).

According to Yukl (1989:252) concepts, such as leadership, may be defined in a variety of manners, depending on in which context it is used. Day, Fleenor, Atwater, Sturm, and McKee (2014:64) state that when studying the underlying processes of leadership behaviour, it is important to recognise leadership development processes. This is due to the unpredictable and ever-changing nature of both adult development and leadership development. Schwab and Davis (2018:234) argues that this may be affected by organisational culture. Leaders should consider the willingness of employees to develop and to become a technologically savvy culture.

Day, et al., (2014:63) state that leadership development, within organisations, includes leader development and feedback processes. Knowledge management is associated with human resources aimed at how knowledge is managed and communicated within an

organisation (Moldenhauer and Londt, 2018:156). The University of Pretoria [UP] (2018:4 & 6) concurs, specifying that augmentation of the labour force provides improved ways to enhance certain tasks within an organisation. The distinction between AI and automation is that AI drives automation. Automation means that a certain system is programmed to perform specific and repetitive tasks from data, whereas AI tries to understand the data.

Davis (2016) defines Industry 4.0 as the creation of “cyber-physical systems”, whereby AI is a subset of cyber-physical systems. These systems rely on electronic systems (the third Industrial Revolution), however, Industry 4.0 enhances electronic systems through integration with societal decision-making and physics. The UP (2018:39) indicates that society should develop an environment that supports growth in automation for its citizens. Canada, for example, is becoming a hub for AI developments. AI-driven companies such as Google and IBM have invested in Canada due to the country's innovative leadership environment. Canada should be an example for South Africa. Schwab (2018) concurs, stating that Industry 4.0 should be made accessible to all of society and new skills are required to adapt to Industry 4.0. Policies and standards are required for AI to assist in its development.

“Table 1” below represents “big data” as the main driver for core changes of job requirements from employees, nevertheless, it is important to note that AI is also listed. “39%” of core

Drivers of change, 2015–2020	Rank
Processing power, Big Data	1
Changing nature of work, flexible work	2
Middle class in emerging markets	3
Mobile Internet, cloud technology	4
Geopolitical volatility	5
Climate change, natural resources	6
Sharing economy, crowdsourcing	7
New energy supplies and technologies	8
Young demographics in emerging markets	9
Rapid urbanisation	10
Women's economic power, aspirations	11
Internet of Things	12
Adv. Manufacturing, 3D printing	13
Artificial Intelligence	14
Robotics, autonomous transport	15
Adv. materials, biotechnology	16

Table 2: Drivers of Change in South Africa, 2015-2020
(WEF, 2017:8)

skills for jobs have and will continue to change between 2015 and 2020 for employees in South Africa. (The World Economic Forum [WEF], 2017:8). Marcouse, et al., (2014:316-317) clarifies that big data may be expensive and time-consuming to gather and organise. Organisations gather data through web-browsing, transactions, electronics and attitudes of customers on social media. Kolbjørnsrud, et al., (2016:4) and Walczak (2016:2) state that data is better processed and utilised for

organisational decision-making when AI does the knowledge management in an organisation.

Ludik's (2019) organisation, the Machine Intelligence Institute of Africa (MIIA), is a company which focuses on the development of AI in South Africa and the rest of Africa. MIIA aims to assist businesses to utilise and understand AI. Many organisations have an abundance of unused data, therefore, organisations should be more data-driven. The companies are unable or inadvertently not using this data because the organisations are lacking in an effective knowledge management system. Ludik's organisation should be an example for other organisations in South Africa.

Moldenhauer and Londt (2018:157) suggests that AI development has implications for unemployment. Leaders should refocus resources to promote skills development, especially in those roles which assist in knowledge management and AI. Galloway-Gaul (2019) states however that South Africa is slow with adopting AI in the workplace, but the continued trend of AI adoption is currently creating new jobs for scholarly employees. Thus, leaders should understand what benefits AI could create for an organisation. The following subsections will build upon the theoretical foundation.

3.2 The Influence of Leaders and Leadership

Cross-organisational acceptance is necessary to ensure the success of new technologies (Barnes and Milton, 2014:107-108). HLMs are more open to adopting AI within organisational work structure, as opposed to FLM (Kolbjørnsrud, et al., 2017:38). One simple way to ensure acceptance is to include all organisational departments into the selection and implementation processes. For example, implementation of an information technology (IT)-based knowledge management system could stagnate acceptance from employees if it is only the IT department tied to the system's rollout (Barnes and Milton, 2014:107-108). Dhir (2019:38-39) utilises the example of Tony Hsieh, Zappos chief executive officer. He is very much employee-orientated. He believes that an employee should stay engaged, have fun and be a part of a positive culture. This type of leadership and employee engagement could reflect positively on employees' work and automatically transform into a desirable result when AI is introduced in an organisation.

Kolbjørnsrud, et al., (2016) state that there are five key aspects which leaders should consider with industry 4.0. The five aspects are; "leave administration to AI, focus on judgment work, treat intelligent machines as colleagues, work as a designer and develop

social skills and networks”. Moldenhauer and Londt (2018:159) agrees, explaining that skills such as; “people management, judgement and decision-making, creativity and service orientation”, align leaders to capably embrace and manage AI. People management and social skills, according to Marcouse, et al., (2014:111), is associated with emotional intelligence. Leaders should have the desire to achieve goals, and at the same time consider and manage their own and others’ emotions. AI should be valued, as referred to by Purdy and Daugherty (2018:3), as a production enhancer which has the potential for continued growth.

Artley (2018) indicates that emotional intelligence is one key aspect of the relationship between leadership and followers which should be investigated in relation to AI. Leadership needs to change to accommodate the changing paradigm of Industry 4.0. Marcouse, et al., (2014:110) describe emotional intelligence as follows; the effectiveness of leaders to manage their own emotions, as well as the emotions of their followers. Artley (2018) continues to indicate that the labour force is adjusting itself to become more reliant and adaptable to the digital space, and leaders are needed to spearhead these changes.

Artley (2018) indicates that AI will most likely be used to enhance leadership roles, especially administrative and analytical roles. Business leaders and governments are prepping the younger generation to focus more on work that entails mathematics, science and engineering to align with the future. Day, et al., (2014:66) describes that inexperienced leaders are better able to change their leadership behaviour, thus enhancing their leadership development. However, experienced leaders are not necessarily HLM. Experience and the effectiveness of leadership development not only depend on the time in leadership roles but the tasks and behaviour of the leader in those roles. Inexperienced leaders are more capable to digest knowledge and convert this knowledge into leadership behaviour. This allows inexperienced FLM to develop and change leadership behaviour. Liebowitz (2001:2) indicates that decision-making from high-level management is usually one of the main issues if a knowledge management system is not well implemented in an organisation. Kolbjørnsrud, et al., (2017:38) attests that high-level managers are more willing to automate roles based on knowledge management, whereas low-level managers are rather willing to only augment certain roles.

Leadership in an organisation is then the main party which needs to have the knowledge to manage embracement of AI in an organisation. Respondents from 112 companies in South Africa state that organisational leadership have “moderate, little or no AI Leadership

competency” (EY Consulting LLC (UAE), 2019:60). A leadership style such as “systems leadership” is required from leaders, whereby new tactics of leadership, towards technologies, is needed to assist in the embracement of AI (Schwab and Davis, 2018:220).

3.3 Artificial Intelligence

Walczak (2016:5) suggests that knowledge managers within companies are crucial in terms of the productivity of a company. AI can play similar roles in an organisation. Through processing data and utilising this knowledge, an organisation can make better decisions. Purdy and Daugherty (2018:3) state, however, that AI should not only be a productivity enhancer, it should also change learning capabilities for leaders.

Interestingly, Kolbjørnsrud, et al., (2017:39) indicate that developing economies, such as India, are more open to AI intervention, compared to developed economies, such as Ireland. Though South Africa is a developing economy, Galloway-Gaul (2019) indicate that South Africa is slow in adopting AI in business compared to other countries. However, the UP (2019:4-5 & 17) state that South Africa is starting to accept the impact AI will have on the economy. The Department of Trade and Industry is researching AI, big data and the internet of things to assess the challenges South Africa faces and how it impacts the economy. The biggest contribution to the development of AI is data. The amplified expansion of data through the internet of things have fuelled the amount of data AI is capable to process.

According to Purdy and Daugherty (2017:4-5), AI could be included as another factor of production. The traditional three factors are; capital, labour, and total factor production. AI has the potential to become a new factor influencing production, as shown in "Figure 1" below. This figure illustrates how a country's economy grows through the “Adapted Growth

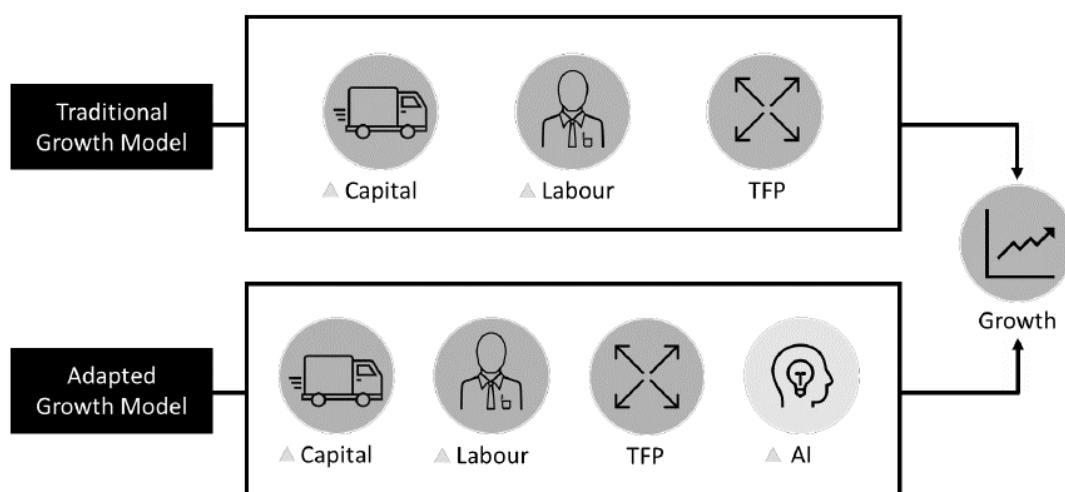


Figure 1: The AI Growth Model (Purdy and Daugherty, 2017:9).

Model". Production growth has declined in the past decades. The factors of production, labour most notably, are slowing down. The labour force count in certain countries has also decreased. AI is currently capable of performing certain tasks faster than employees can, nevertheless AI is not as developed in terms of emotional intelligence. The UP (2018:5-6) concurs, suggesting that AI will drive production growth in three ways; "intelligent automation of the workforce, augment both labour and physical capital, and drive innovation".

The augmentation of labour, as referred by the UP (2018:6), could streamline tedious jobs to align skilled employees to focus on customer service, value creation and networking. Galloway-Gaul (2019) explains that labour-related jobs may be one of the first jobs to become less relevant. For example, Amazon Go, a food retail store, requires no cashiers. Cameras track what customers put into their baskets and bills them automatically when they exit the store. The UP (2018:5-6) states that AI can continue to assist innovators in the organisation, by freeing up time to handle menial jobs. Intelligent automation of AI is not only capable of storing and accessing knowledge, such as traditional knowledge management systems, but develop as a system continually as the organisation grows.

Moldenhauer and Londt (2018:156) states that menial jobs will be continually replaced by AI. This has been predicted in research as early as 1993 and has already been practically implemented in organisations. Purdy and Daugherty (2017:12-13) provide an example with Amelia, an "IPsoft" software. Amelia is an AI software which assists engineers with valuable information during their work. Amelia has all the needed knowledge and solutions stored for the engineers. This AI software is also capable to learn. If there is a situation which Amelia cannot resolve, the AI enquires from human colleagues to close its knowledge gap, so that it is capable of performing the task.

AI can assist or supplement tasks which managers perform (Walczak, 2016:2), which could lead to job loss. The workforce should be upskilled or "reskilled". Leaders of a company should implement policies and programs which assist in skills development (Dhir 2019:10). Kolbjørnsrud, et al., (2017:40-41) explain that AI integration should be focused on supporting leaders and leadership within organisations. This text has already revealed that AI integration could support leadership decision-making and data processing for knowledge management. The next subsection will further explain the significance towards the upskilling of employees.

3.4 The Importance of Reskilling and Upskilling

Xing, et al., (2018:223) indicates that education will become increasingly relevant for organisations in the future. Graduates from tertiary institutions in the corporate sector will discover value from returning to their institutions to remain informed and educated with rapid developments in Industry 4.0. Especially with leadership behaviour, Day, et al., (2014:64), suggests that changes and developments in leadership behaviour are mainly due to training or upskilling of leaders. An important factor regarding upskilling, according to Xing, et al., (2018:223), is that educational institutions should keep renewing and updating their curriculum and content. This is partly due to the exponential expansion brought on by Industry 4.0, in addition to Day, et al., (2014:64) adding that the everchanging environment of leadership forces change to sustain future success for leaders.

Xing, et al., (2018:224) argue that updating knowledge should not only originate from educational institutions but colleagues and experts as well. The displacement of jobs, as described by Artley (2018), due to Industry 4.0 is a similar occurrence to what happened in the 1900s. The Industrial Revolution displaced people out of work and forced them to educate themselves to, for instance, work with the machinery which replaced peoples' jobs. Leaders, according to Purdy and Daugherty (2017:21), should be role models for this change. However, AI might need role models just as much as employees, and vice versa. AI might be a role model for employees as well.

Dhir (2019:18-19) explains that AI is continually evolving into a better resource for organisations to use. Though it is replacing work, it is also providing opportunities for work development and new types of jobs. A learning organisation with an adaptable culture is becoming the norm for successful organisations. Liebowitz (2001:3) however states that employees' reluctance to change makes it difficult for organisations to turn into a learning organisation. Day, et al., (2014:68-69) agrees, indicating that affable leader-follower relationships enhance the willingness of employees to support the change into a learning organisation. Liebowitz (2001:3) states that a knowledge manager should be placed in each department to assist in this adjustment period and for knowledge management purposes.

Moldenhauer and Londt (2018:158-159) indicate that the choice of an AI-driven knowledge management system could be assessed through a skills audit. The skills audit should be spearheaded by the leaders in the organisation and highlight certain challenges leaders and the organisation have and could face. Skill audits should evaluate the skills, knowledge and aptitudes of employees with regards to the goals of an organisation. Walczak (2016:5)

corresponds, describing the acquisition of knowledge through learning should be like a mentor-prodigy relationship. Leaders, in concomitant with AI, should be the mentor for employees to become better decision-makers and allow AI to assist in these processes.

Walczak (2016:5) explains that one of the important outcomes of AI is better decision-making from leaders and employees. An AI system which focuses on knowledge management provides this outcome for an organisation because it is comparable to the ideal situation of a mentor-prodigy situation. Employees agree, according to Dhir (2019:19), that traditional hierarchical structures are not complimenting the way employees want to work, develop and provide valuable input for organisations. Walczak (2016:3) continues describing that AI could assist in getting the right information, to the right person at the right time.

3.5 Knowledge Management

"Knowledge is critical to the understanding of AI" (Moldenhauer and Londt, 2018:156). Barnes and Milton (2014:1-2 & 103) describe that the process of knowledge management in organisations are highly reliant on technology. Especially considering the reliance of organisations on technology-based knowledge management systems. Metadata and taxonomy are synonymous with knowledge management, which focuses on data collection, classification, and pattern recognition, aimed at customer and business data. The continual and rapid development in leadership, as suggested by Moldenhauer and Londt (2018:157), provides opportunities for leaders to utilise AI in assisting in, and identifying issues that arise from strategic decision-making.

Xing, et al., (2018:2-3) contributes that Industry 4.0 is the automation of knowledge, whereby AI and robotics are two of the main components. Liebowitz (2001:1) clarifies the relationship between AI and knowledge management. Knowledge is the exploit of acting upon information gained through experience, and knowledge management is the way this knowledge is utilised within an organisation. AI cannot only supply information for decisions but also enhance decision-making capabilities of an organisation.

Kolbjørnsrud, et al., (2017:38) explain that most managers believe AI's impact will be mainly preoccupied with administrative work, and less so with community engagement, business strategies and innovation. High-level managers are more willing to allow "automation and augmentation" of certain analytical and administrative roles which managers preoccupy themselves with. Liebowitz (2001:2) suggests that no matter how well a knowledge management system works, the willingness of employees to input and utilise the knowledge

is key to its success in an organisation. Barnes and Milton (2014:103), however, consider that the success of knowledge management systems is based upon what the needs of the organisation are. Most successful knowledge systems are focused on people and processes, not solely on certain technologies.

Galloway-Gaul (2019) describes that certain data-intensive work becomes repetitive and time-consuming. AI is capable to perform and learn these skills, such as transaction processing and data management, to streamline the work process. The accounting-, human resource- and supply-chain departments may benefit the most in this regard. For example, Galloway-Gaul (2019) indicates that “MakeSense”, a South African company, utilises its AI systems in other organisations to assess workplace efficiency to cut costs at companies. The UP (2018:19) provides “SyeComp” as another example of an African country using AI and knowledge management in concomitant for agriculture. The company processes “geospatial data” to “support various actors in the agricultural value-chain”. The following section will deal with the research methodology for this research report.

4 RESEARCH METHODOLOGY

The focus of the research is leadership behaviour with regards to AI's influence on knowledge management, and the acceptance of AI by business managers. These managers in NMB were distinguished between FLM and HLMS. HLMS include both mid-level and high-level managers. Electronic surveys were distributed to gather information for the study. It is pertinent for leaders in NMB to accept and learn in concomitant with AI because Galloway-Gaul (2019) indicates that South Africa is in the wake of AI development. Moldenhauer and Londt (2018:155) state that adoption from leaders could have far-reaching positive effects for South Africa. There are minimal studies in South Africa regarding AI and its benefits, however, the WEF (2017:3) adds that South Africa has one of Africa's largest and most diversified economies. Kolbjørnsrud, et al., (2017:42) describes AI intervention within organisations are inevitable. It is the leaders' responsibility that AI does not cause dysfunction in an organisation. For these reasons, AI intervention in NMB could not only assist NMB to develop but also South Africa, and research into the acceptance of AI in the service industry of NMB is imperative. The research design will further discuss the research paradigm, in terms of the research approach and interpretation.

4.1 Research Design and Paradigm

This research study has adopted a deductive theorising approach. The deductive (or top-down method) was supported by the scholarly theory, which was tested through the research done into leadership behaviour and knowledge of managers in NMB. (Du Plooy-Cilliers, et al., 2014:48-49). Thus, this research will be objective and based on observable facts (Maree, 2016:22)

Reliability and validity, as described by Du Plooy-Cilliers, et al., (2014:25-27 & 75-76), was focused upon through developing a positivistic research paradigm. Subsequently, descriptive research was utilised through quantitative analysis. The epistemological and ontological positions of positivism were focused upon. Ontology associates with epistemology through the reality of how research is done through prediction. The phenomenon which was studied was the causal relationship between leadership behaviour through knowledge management and the acceptance of AI from leaders within NMB. Thus, knowledge of business leaders was studied, and the reality of their behaviour assessed. Kolbjørnsrud, et al., (2017:38) stated through their research that higher-level management has more knowledge of AI. Du Plooy-Cilliers, et al., (2014:26) explains that a phenomenon would be able to be duplicated in similar circumstances with all people, thus this

phenomenon may occur in South Africa as well. For this reason, there is a distinguishing factor made between HLMs and FLMS.

Bryman, Collinson, Grint, Jackson, and Uhl-Bien (2011:17) state that utilising surveys are popular in leadership studies. Many of these questionnaires are aimed at leader behaviour, however, this study will include knowledge management. The survey was based on research conducted by Kolbjørnsrud, et al., (2017:37-38), whereby 1700 managers were surveyed across the world concerning leader openness to AI. Questions from this study, as well as additional questions, were developed applicable to leadership behaviour in NMB, and AI's influence on knowledge management. The NMB Business Chambers was originally used as an online database to sample organisations in the service industry, however, the sampling method had to be adapted.

4.2 Population and Sampling

The population is all the people or social artefacts which needs to be studied, and the people or social artefacts should share specific characteristics. These shared characteristics are called the population parameters (Du Plooy-Cilliers, et al., 2014:132-133). The list of parameters for this study are; business managers, in leadership roles, which work for an organisation in the service industry and are residing in NMB. Thus, Du Plooy-Cilliers, et al., (2014:133-134) indicate that all the leaders who fall within the population parameters are the target population. The accessible population was originally sampled from the NMB Business Chambers.

The accessible population is acquired by deciding on the target population. The sample needs to be a representation of the target population. Systematic sampling, a probability sampling method, was first considered to access the sample. However, there is no clearly defined list of all the businesses in South Africa or NMB, nor is the target population fully accessible. Consequently, the research followed a non-probability research method; purposive sampling. The nature of this sampling method is appropriate because purposive sampling requires specifically defined parameters of the sample, which must be purposefully chosen (Du Plooy-Cilliers, et al., 2014:134-137 & 142-143). Strydom (2011:231) indicates that non-probability sampling is standard for studies which do not have a known population size, such as this research report.

A total of 226 surveys were distributed. 199 surveys were distributed electronically through purposive sampling and another 27 through a mixture of convenience and snowball sampling. A single manager from the NMB Business Chambers responded during the purposive sampling phase, which is a “0.5%” response rate. For this reason, convenience and snowball sampling were implemented in combination with purposive sampling. The other 27 managers all answered, however, three respondents answered the survey either incorrectly or partially. Thus, the sample is 25, 11 FLMS and 14 HLMS.

Du Plooy-Cilliers, et al., (2014:142-143) defines convenience sampling as those people whom the researcher can easily come in contact with, and who are easily accessible. Snowball sampling gathers enlarges the sample through referrals and suggestions from already sampled people. The second phase gathered 24 responses, 22 hard-copies and two online responses on Google Forms. Convenience sampling was introduced as the first step of the second phase of sampling. Snowball sampling was then introduced when a business manager was able to indicate another possible respondent for this research report. Strydom (2011:233) argues that this method is ideal for novel research, such as this research report into leadership behaviour towards AI which is relatively unstudied in NMB.

4.3 Data Collection and Analysis

The survey was assembled and edited in “Google Forms”, which was used as a distribution method as well. Both Google Forms and Microsoft Excel was initially considered to process statistical data for the survey results. However, due to low response rates and a sample who are not willing to complete the survey online, Microsoft Excel was used exclusively for processing the data. The International System of Units, as described by Du Plooy-Cilliers, et al., (2014:210-211 & 224-225), was utilised within Microsoft Excel. Visual aids for graphical representations of data were inserted to better understand the findings of this research. These representations were based on the survey results. The text was utilised in conjunction with the graphical representations to describe the data in more detail. Descriptive statistics was applied (median, mode and mean) applicable to the questions of the survey.

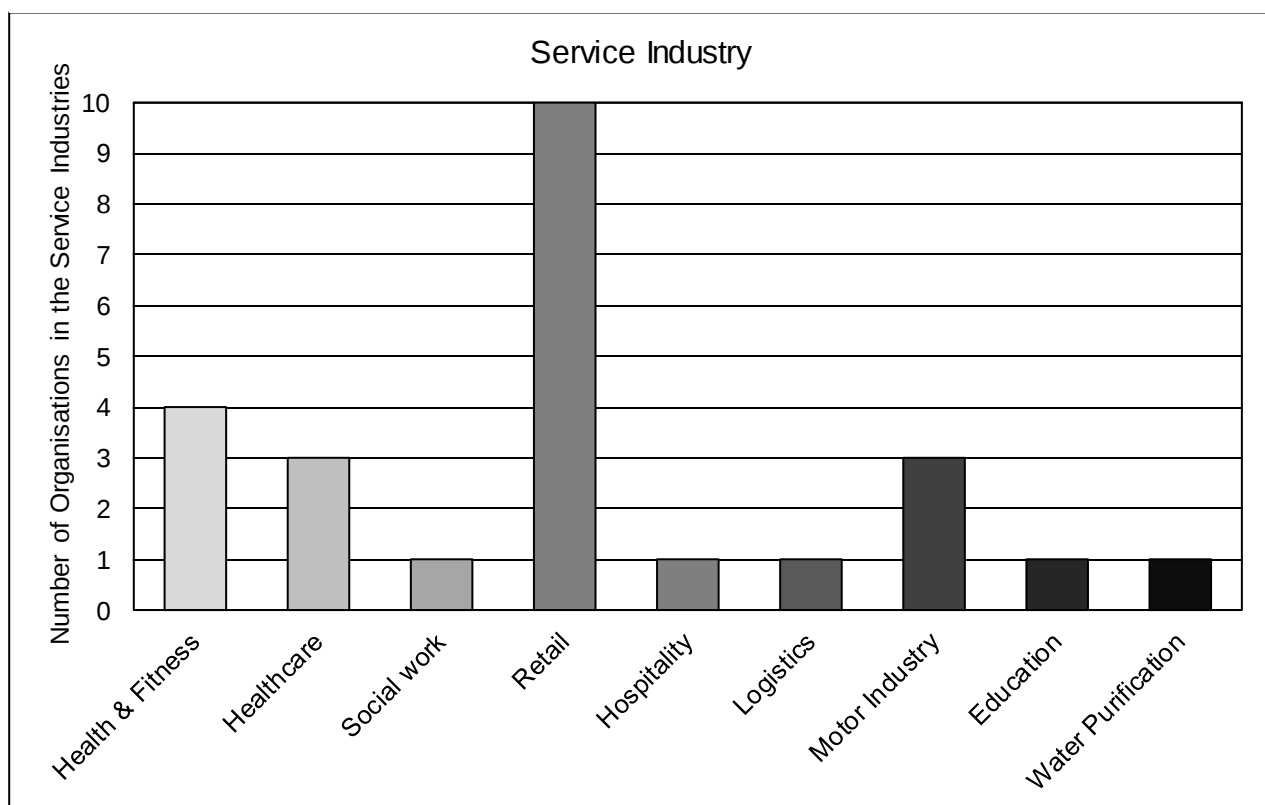
A “cross-sectional survey design” was chosen, whereby one type of survey will be distributed once to all participants. A Likert scale was applied, as well as other closed questions aimed at the purpose of the study (Du Plooy-Cilliers, et al., 2014:149). Ranking questions, which the respondents chose based on its importance, and category questions, whereby they choose one answer based on different categories, was used in the survey as well (Maree,

2016:182-183). Bryman, et al., (2011:18) state that utilising surveys in leadership research is inexpensive and flexible. Leadership outcomes are easily researched, in concomitant with a variety of other causal relationships. The penultimate section will discuss the findings from the research conducted.

5 FINDINGS AND INTERPRETATION OF FINDINGS

The findings of this research will be discussed and interpreted in relation to the responses of 25 business managers in NMB. The main findings will be the focus and compared to previous literature. The aim of the findings is to support the three research questions and the two objectives. “Figure 2” below provides a breakdown of each sector of the service industry of each organisation. The following subsection will discuss the interpretation of the findings and link it to literature.

Figure 2: Service Industry



5.1 Interpretation of Findings and Association with Literature

FLMs and HLMs compare relatively equal in terms of their trust in AI as indicated in “Figure 3” on the following page. However, five HLM compared to two FLM would trust the advice of AI if they “understand how the system works and generates advice”. Most FLMs trust AI if “the system has a proven track record”. Kolbjørnsrud, et al., (2017:41) obtained similar results, with both of these statements they received the most responses. “AI-generated advice hinges on a manager’s understanding of how the system works, a proven track record and the technology’s ability to provide a convincing rationale for its advice”. This is true of this research report for the first two statements. Only one HLM and one FLM indicated

that “nothing would allow me to trust advice generated by an intelligent machine”, whereas for the Kolbjørnsrud’s, et al., (2017:41) study this response had the lowest response rate.

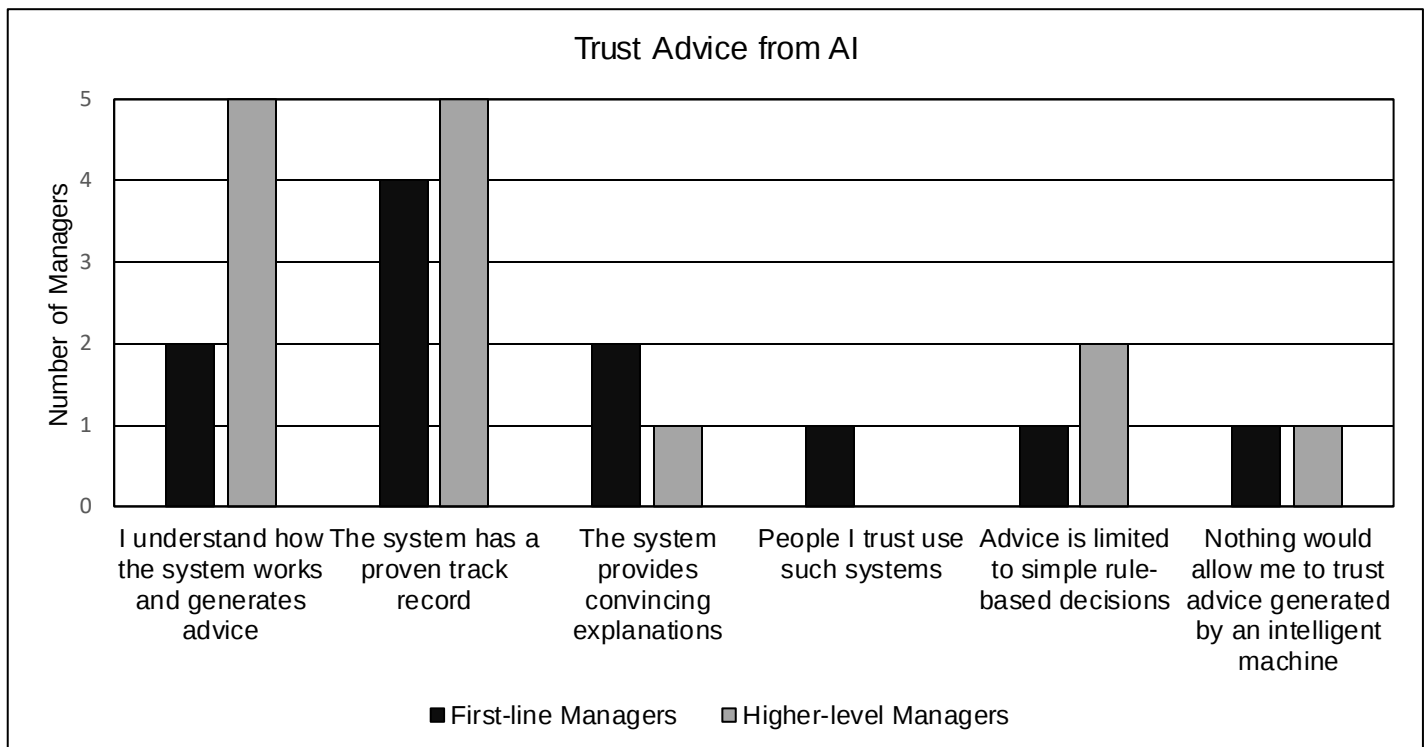


Figure 3: Trust Advice from AI

Business managers were relatively undecided with regards to trusting the advice of AI in making business decisions. 56% of the respondents were neutral, 28% agreed and only 12% either "disagreed" or "strongly disagreed". 43% of the managers who were "neutral" also stated that they were “neutral” in taking responsibility for the actions from AI, and 29% "disagreed" with this statement. Of all the business managers, 32% respectively either were “neutral” or "agreed" that they would take responsibility for the actions of AI.

17 business managers stated that the organisations they work for have knowledge management systems, three were unsure and five indicated that the organisations had no knowledge management system. 84% of managers indicated that employees are currently utilising the knowledge available to them in the organisation. This result is a good sign, according to Barnes and Milton (2014:103) knowledge management should be focused around employees and not solely on technologies, such as AI.

Liebowitz (2001:4) suggests that knowledge-based jobs will become ever more important and that skills development is key to a successful employee. Knowledge requirements from employees in different industries are growing. Dhiri (2016:5) states that mentoring, and workshops are key for dissemination and integration of knowledge from leaders to followers. "Workshops" was the most common answer in terms of skills development for employees

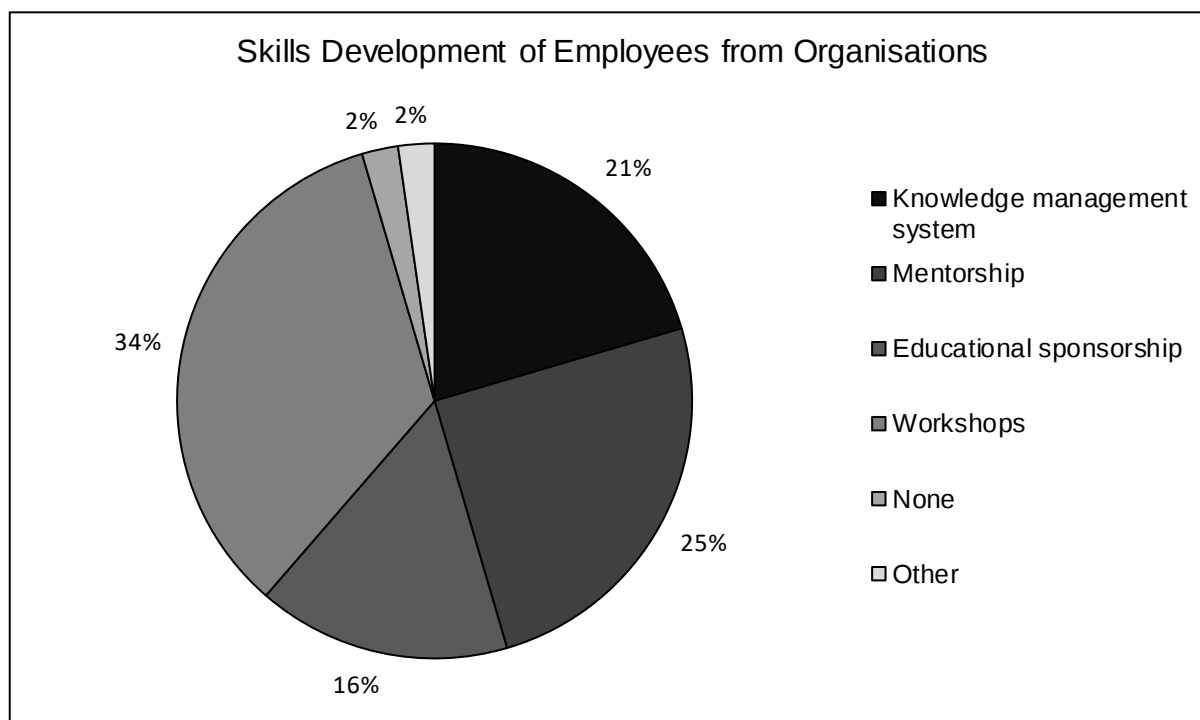


Figure 4: Skills Development of Employees from Organisations

at organisations. 15 out of the 25 managers indicated that workshops are one of the systems the organisation, they work for use for skills development. “Figure 4”, presented above, represents the percentages of different knowledge acquisition methods employees are able to utilise for skills development as per the business manager (respondents could pick more than one option, which cumulated to 44 responses). Mentorship had the second-highest responses, whereby 11 out of the 25 business managers selected this option. Walczak (2016:5) indicates that a mentorship relationship is one of the key processes to transfer knowledge from leaders to employees.

Administrative tasks had the most responses in terms of the tasks business managers are comfortable with AI performing (15 out of 25 managers). Marketing had nine responses, followed by finance and accounting with eight, and employee management with seven response. Business managers were more “neutral” when asked if they are comfortable with AI evaluating their work, as displayed by “Figure 5” on the following page. 44% answered they were neutral and 28% indicated that they “agree”. This shares similar results with Kolbjørnsrud, et al., (2017:41), whereby more HLM who were comfortable with AI monitoring and evaluating their work. However, there were 15% of the FLMs and 42% HLMs “strongly agreed” with these statements. Only 12% and 8% of the total sample “strongly agreed” with AI monitoring and evaluating their work respectively, in this research report.

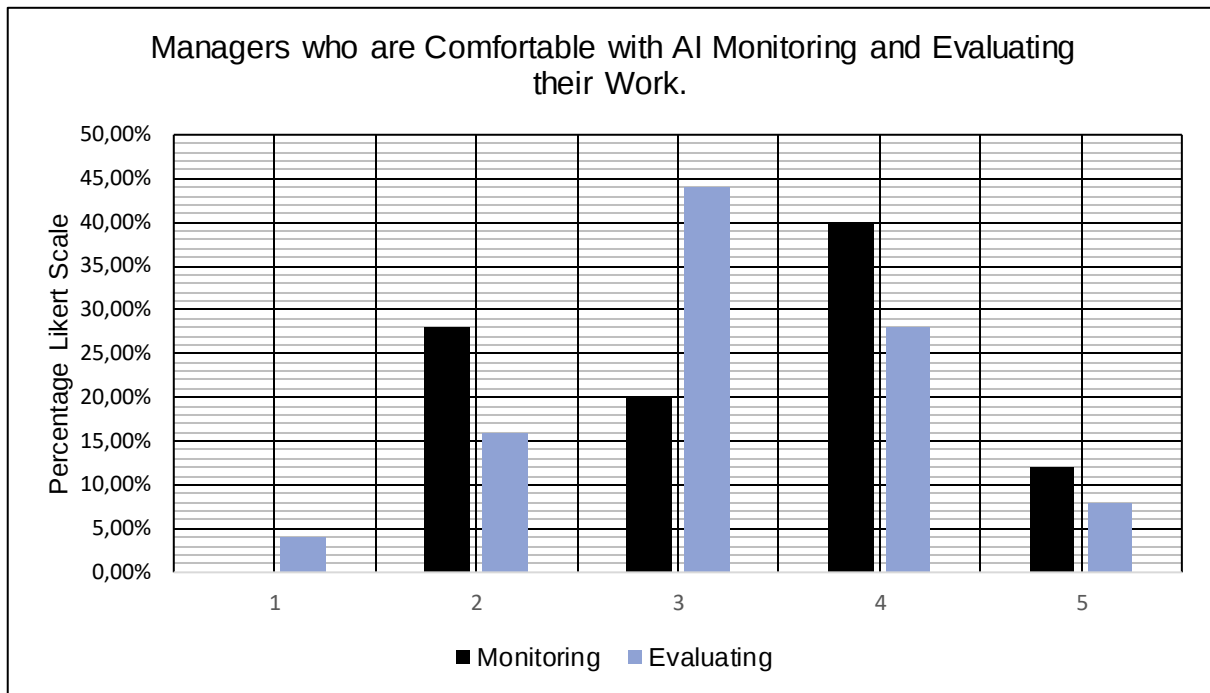


Figure 6: Managers Comfortable with AI Monitoring and Evaluating their Work

The respective means for questions 8 to 14 across all managers were between "2.7" and "3.2", as represented in "Figure 6" below. The medians for these same questions are all "3" except question 10, which has a median of "4". Question 10; "I am comfortable with artificial intelligence monitoring my work", is a Likert scale question. 40% of the respondents

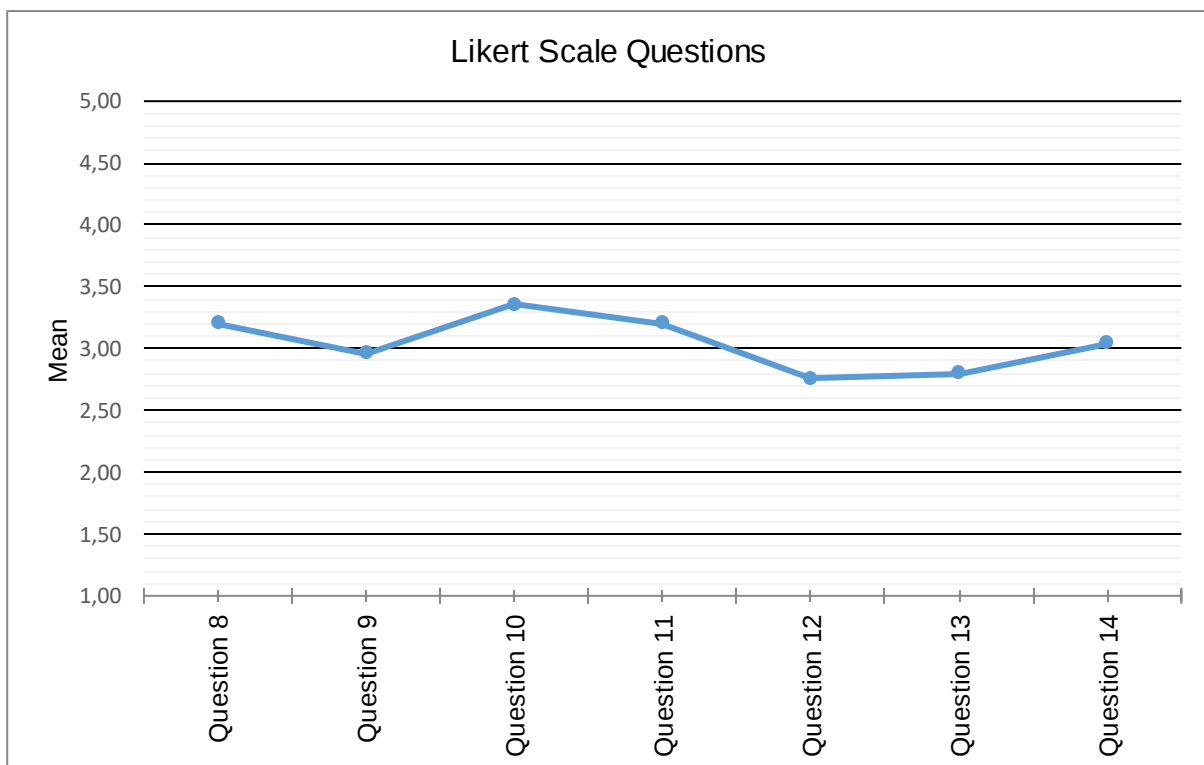


Figure 5: Likert Scale Question Means

indicated that they “agree” with this statement, 28% indicated that they “disagree” with this statement, and 20% were “neutral”. There were more HLM who “agreed” with this statement and more FLM who “disagreed”. These results are similar to Kolbjørnsrud, et al’s., (2017:39) research. They found that developing economies, such as South Africa, are more receptive to AI monitoring and evaluating their work, compared to developed economies.

40% of the managers “disagreed” and 24% were “neutral” regarding that they have knowledge of the benefits AI. Similarly, 40% were “neutral” and 32% “disagreed” that they have knowledge regarding the benefits of AI and business decision-making. EY Consulting LLC (UAE) (2019:60) indicates that employees acknowledged that they do not believe that leaders within their organisation have the relevant knowledge to lead the organisation they work for in terms of AI intervention. There was only one manager who stated that he/she has knowledge of AI in business decision-making and knowledge management. The chart below; “Figure 7”, represents these results. Furthermore, 40% of business managers indicated that their knowledge management systems assist them in managing knowledge in the organisation. 28% either “disagreed” or “strongly disagreed” with regards to the same statement.

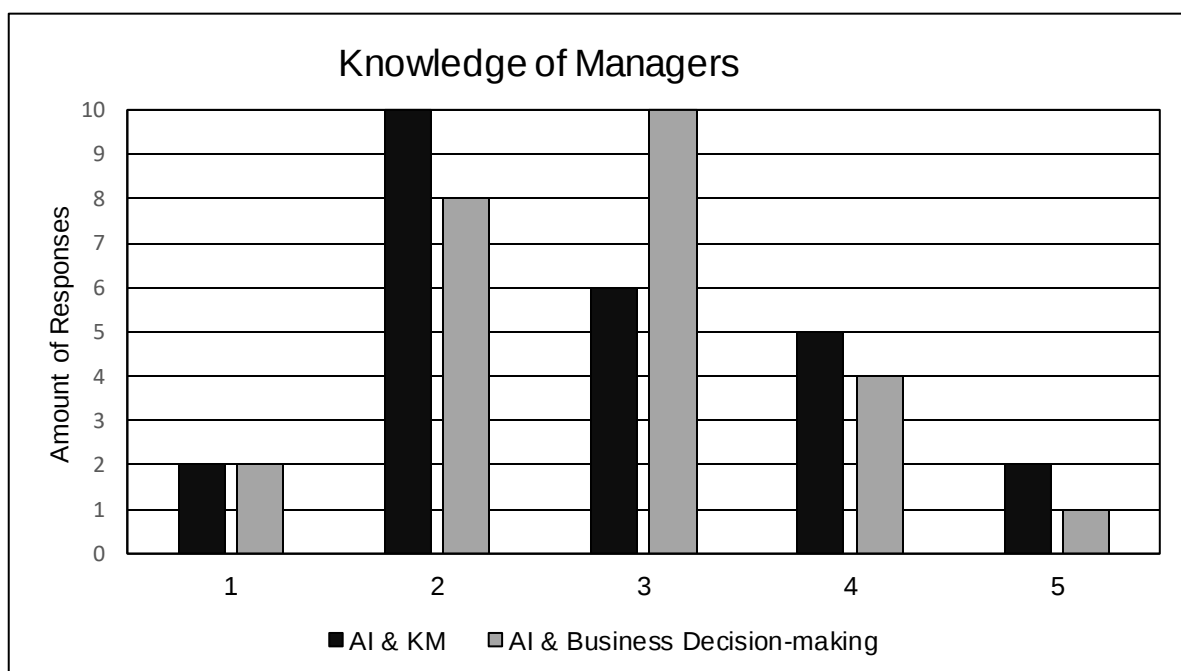


Figure 7: Knowledge of Managers

The next subsection will examine a summary of the findings discussed in this section in table format.

5.2 Summary of Key Findings

The following table; “Table 3”, is an indication and summary of the findings presented in the previous section, solely in percentages.

Table 3: Summary of Key Findings			
Survey Questions:		Findings:	
Business Managers	FLMs; 11	HLMs; 14	
Likert Scale Questions			
AI Monitoring Work	Disagree; 28%	Agree; 40%	
AI Evaluating Work	Neutral 44%	Agree; 28%	
Trust AI in making Business Decisions	56%; Neutral	Agree; 28%	
Accepts the responsibility of Actions from AI	Neutral; 32%	Agreed; 32%	
Knowledge of AI benefits towards Business Decision-making	Disagree; 32%	Neutral; 40%	
Knowledge of AI	Disagree; 40%	Neutral; 24%	
Other Questions			
Knowledge Management System in the Organisation	Yes; 68%	No; 20%	Unsure; 12%
Employees utilise Knowledge within an Organisation	Yes; 84%	No; 12%	Unsure; 4%
Trust AI	“The system has a proven track record”		
Tasks Business Managers are comfortable for AI to perform	Administrative tasks.		
Employee Skills Development	Workshops; 60%	Mentorship 44%	

5.3 Validity and Reliability

Reliability and validity of research links to the credibility of the research. Validity is improved by having the “golden thread” throughout research; the findings lend itself to answering the research questions (Du Plooy-Cilliers, et al., 2014:254-257). The fact that this research is based on research conducted by Kolbjørnsrud, et al., (2016 & 2017) adds to the reliability and validity. Du Plooy-Cilliers, et al., (2014:47) define openness of research to be the degree of openness the research has in terms of “explanations, interpretations and improvements”. This research has been open for interpretation since its’ conception. A similar study could be duplicated in another area, other than NMB.

A pilot study was conducted by disseminating the surveys to persons who would be able to provide feedback and who will not be represented in the findings of the research. This enhances the feasibility of the research, whereby the measuring instruments and clarity of the questions will be tested (Du Plooy-Cilliers, et al., 2014:257). Surveys were distributed to a small selection of the population using convenience sampling. Google Forms was the platform for the dissemination of the survey in the pilot study. The results were not judged for this research, although the feedback gathered from the pilot study was utilised to further develop and modify the survey. The final section will follow; the conclusion.

6 CONCLUSION

AI is continuing to integrate into society. The important factor is that AI should learn through human values and societal observation (Schwab and Davis, 2018:125). This integration will be a cross-learning process. Policies need to be re-evaluated and developed to accommodate the changing paradigm of work (Purdy and Daugherty, 2018:21). The research conducted for this study has revealed some mixed results, as discussed in the findings, nevertheless, the next section will further discuss key findings and more specifically answer the research questions posed for this research report.

6.1 Discussion of Research Questions

- Main Question; “What is the leadership behaviour of current Nelson Mandela Bay business managers with regards to artificial intelligence?”

The findings from this research report have been relatively similar to other research which has been conducted worldwide with regards to the link between leadership behaviour and AI. Moldenhauer and Londt (2018:160) argue that the embracement from leaders with regards to AI is essential for South Africa’s development. The findings of this research report indicate that the sample of business managers in NMB are open to the intervention of AI in their organisations. However, the business managers do want to be relatively in control of what business decisions the AI can make. For instance, administrative tasks had the most responses from business managers whereby they would be comfortable to be managed by AI. Kolbjørnsrud, et al., (2016:2-3) specify that administrative tasks are what consumes the work time for business managers the most. The fact that business managers state that they are comfortable with AI managing administrative tasks stipulates that they might understand the benefits AI could have in these terms.

More business managers “agree” to their work being monitored by AI, as compared to it being evaluated by AI. Business managers are more comfortable with AI intervention in the organisation they work for than they would be comfortable with taking responsibility for decisions the AI makes. The leadership behaviour of business managers in NMB is relatively sceptical, however, most of the sample are comfortable with AI intervention within the organisations they work for. Knowledge from business managers is also important, which will be discussed next.

- Sub Question 1; “Do Nelson Mandela Bay business managers understand the benefits of artificial intelligence?”

No, they do not, or not to the extent which is required by business managers in leadership roles. Most of the business managers are either undecided or know that they do not fully understand what benefits AI may have in terms of its benefits towards business decision-making and knowledge management. More business managers have knowledge with regards to AI's benefits towards knowledge management than business decision-making. HLMs especially (5 out of 14) would only trust AI if they understand how the system works. Business managers remained undecided in respect of accepting advice from an AI system with regards to business decision-making. Even more so were sceptical in taking the responsibility of AI decision-making.

- Sub Question 2; “Do higher-level managers embrace artificial intelligence more than first-line managers?”

HLM compared to FLM's findings were moderately mixed compared to the findings of Kolbjørnsrud, et al., (2017:38) whereby HLM embrace AI considerably more than FLM. The findings of this research report indicated that HLM trust AI slightly more than FLM. The lowest number of business managers indicated that they would trust AI if someone they trust utilises the same AI system. This statement has the possibility of developing in a new research study. There was only one respondent who indicated he/she would never trust AI, which was a FLM. Interestingly, the only two respondents who “strongly agreed” with AI evaluating their work were FLM, and the only respondent who “strongly disagreed” was a HLM. However, there were many more HLMs who “agreed” to AI monitoring their work, although there were again two FLMs who “strongly agreed”.

The discussion of the research question, as above, has fulfilled the two objectives of this research report. The following subsection will discuss the implications and the heuristic value of this research report.

6.2 Heuristic Value and Implications for Future Research

This research report has contributed to the knowledge of leadership behaviour with respect to AI from leaders in NMB, in the service industry. AI is shifting the paradigms of business and is continually accomplishing tasks which humans accomplish. Some examples are; AI software which navigates complex terrains in autonomous drones and trucks, and robots doing the work of personal assistants for organisations (Schwab and Davis, 2018:124).

Research at Accenture found that AI has the potential to double economic growth of currently developed economies by 2035 (Purdy and Daugherty, 2018:3). AI intervention in developing economies could enhance labour productivity and decrease labour cost. A Chinese organisation laid-off around 60,000 labourers to automate their production line (Schwab and Davis, 2018:129). This uncertainty of work security is difficult to overcome, especially considering South Africa's "50%" youth unemployment rate and "9%" of South African organisations indicating that unskilled employees are a "major constraint" (The UP, 2018:26). Labour disputes in South Africa may continue to arise due to job losses from the intervention of AI (Moldenhauer and Londt, 2018:157).

The MIIA is collaborating with firms who share their same vision for AI in other African countries to share knowledge as well as attract and retain AI-mavens. Leaders should continue to embrace AI, however, it should be focused around people and their ethics and values (The UP, 2018:36-37). Kolbjørnsrud, et al., (2017:37) provides evidence that leader acceptance, knowledge and willingness to embrace AI depends on the geographical location and managerial level. Leadership behaviour is a good predictor to organisational success with regards to AI adoption. All stakeholders of an organisation are required to make the implementation of AI a success. A study into leaders' perception of AI and what they think the future holds for AI within organisations in NMB could be a qualitative or mixed methods research study.

AI as a concept has already opened many research avenues, but AI in concomitant with leadership studies is still understudied. This research report could be taken further by enlarging the population to better generalise leaders in NMB, and possibly South Africa. Key traits leaders require for AI implementation, and different implementation methods, are further avenues of research which could be studied in NMB. These various avenues of research could be conceptualised into a construct; the role of leadership in the implementation of AI, and thus Industry 4.0.

AI implementation allows employees to work efficiently with their time. "84%" of employees surveyed by an Accenture study stated that AI would allow them to perform their work more effectively and they would find their work more interesting (Purdy and Daugherty, 2018:17 & 24). Employee management has close relations with emotional intelligence. Emotional intelligence is mentioned in the literature of this research report, it has not been a main point of research. Characteristics of an emotionally intelligent leader have been studied, such as leadership behaviour towards AI adoption, nevertheless, further research is required (Marcouse, et al., 2014:111; Purdy and Daugherty, 2017:4-5). EY Consulting LLC (UAE),

(2019:60) argues that AI still requires significant development. AI is currently able to recognise traits of human behaviour, although, it is not capable to lead or make decisions based on human behaviour. Leaders and employees are needed to assist AI in this regard, with respect to how they interact with AI.

Leaders should allow and support Industry 4.0 to have an equal impact on all societies and across all countries. Although this research only focusses on business managers in leadership roles, it is the leaders' responsibility to involve all stakeholders in these conversations regarding AI and knowledge management, so that no one is left behind (Schwab and Davis, 2018:64). This research report and the research conducted by Kolbjørnsrud, et al., (2017) should be periodically conducted. This is so that the scope of leadership and AI could be further understood, as well as monitor if leaders are continuing to accept and embrace AI as a new stimulus in organisations. Furthermore, this study could be duplicated based on Day, et al's., (2014:66) research; experienced versus inexperienced leaders, as opposed to FLMS versus HLMS.

All the possible research avenues discussed in this subsection could be considered as research gaps of this study. This will also be discussed in the "Limitations of the Research". Nevertheless, the following subsection will deal with the ethical considerations for this research report.

6.3 Ethical Considerations

The nature of the study was a quantitative, positivistic study (Bryman, et al., 2011:183). Probability sampling would have been the best option for this type of study, however, there was not access to all organisations within NMB. The combination of purposive, convenience and snowball sampling, non-probability sampling, were chosen due to the ease of dissemination and to minimise contact with the sample. The business managers answered the questions at their own time and comfort. The submission was only collected when it was convenient for the business managers.

Consent from all participants was asked, and all organisations or managers remained anonymous in the research report, which is defined by Du Plooy-Cilliers, et al. (2014:264) as "informed consent". This research will not discuss or disseminate sensitive information. The data was collected and interpreted in an unbiased, objective manner.

According to Du Plooy-Cilliers, et al. (2014:272) there are a few steps, which was used in this research, to ensure that the research is ethical. For example, working together with

other researchers, discussing grey areas of ethics and proofreading each other's research provided valuable input regarding the development of the research. Pod-sessions, introduced by the IIE's Varsity College, was used with fellow Honours in Bachelor of Commerce students to discuss ethical issues and other issues, as well as general research assistance. Feedback was provided through multiple assignments linked to the research, which included the research proposal, concept document and literature review. The final subsection for this research report discusses the limitations.

6.4 Limitations of the Research

Time constraints of the study limit the amount of research which could be conducted. The research time frame is approximately 6 months. Monetary constraints also apply, if applicable, research will be self-funded. The lack of funds constrained this research to the NMB area. This research report did not delve into the perceptions business managers or leaders have with regards to AI, it investigated the knowledge and leadership behaviour of business managers. A study into the perceptions business managers have with regard to AI and what they believe the future entails in this respect could be another avenue of investigation.

A further limitation is not considering the effects and method of implementation of AI in organisations. Kolbjørnsrud, et al. (2017:3) state that how AI is implemented in an organisation is important due to the rate of acceptance from managers. A top-down implementation may incur resistance and bottom-up implementation may cause a lack of innovation. Moldenhauer and Londt (2018:160) suggest that the markets continue to be highly competitive, and AI development is necessary for an organisation to be successful. Subsequently, another limitation of this research is that it will not assess organisational success if AI is not implemented, nor the effects of leadership behaviour towards the resistance of AI implementation. These two limitations do not affect the outcome of this study, however, additional investigations could further the body of knowledge with regards to leadership behaviour in NMB.

7 REFERENCES

- Artley, J., 2018. *How to be a leader in the Fourth Industrial Revolution*. [Online] Available at: <https://www.weforum.org/agenda/2018/01/how-to-be-a-leader-in-the-fourth-industrial-revolution/> [Accessed 21 February 2019].
- Barnes, S. & Milton, N. J., 2014. *Designing a Successful KM Strategy : A Guide for the Knowledge Management Professional*. New Jersey: Information Today Incorporated.
- Bryman, A. Collinson, D., Grint, K., Jackson, B. & Uhl-Bien, M., 2011. *The SAGE Handbook of Leadership*. London: SAGE Publications Ltd.
- Cambridge University Press, 2019. *Meaning of service industry in English*. [Online] Available at: <https://dictionary.cambridge.org/dictionary/english/service-industry> [Accessed 02 June 2019].
- Davies, M., 2018. *Industry 4.0 to Revolutionise Manufacturing Sector* [Interview] (18 October 2018).
- Davis, N., 2016. *What is the fourth industrial revolution?*. [Online] Available at: <https://www.weforum.org/agenda/2016/01/what-is-the-fourth-industrial-revolution/> [Accessed 21 February 2018].
- Day, D. V., Fleenor, J. W., Atwater, L. E., Sturm, R. E. & McKee, R. A., 2014. Advances in leader and leadership development: A review of 25 years of research and theory. *The Leadership Quarterly*, Volume 25, pp. 63-82.
- Dhir, S., 2019. *The changing nature of work, leadership, and organizational culture in future ready organizations*. Claremont: Claremont McKenna College.
- Du Plooy-Cilliers, F., Davis, C. & Bezuidenhout, R. M., 2015. *Research Matters*. Claremont: Juta and Company Ltd.
- EY Consulting LLC (UAE), 2019. *Artificial Intelligence in Middle East and Africa: South Africa*, Johannesburg: Microsoft.
- Galloway-Gaul, I., 2019. *How artificial intelligence is growing in the workplace*. [Online] Available at: <https://www.moneyweb.co.za/news/tech/how-artificial-intelligence-is-growing->

in-the-workplace/

[Accessed 3 May 2019].

Kolbjørnsrud, V., Amico, R. & Thomas, R. J., 2016. How Artificial Intelligence Will Redefine Management. *Harvard Business Review*, November(02), pp. 1-6.

Kolbjørnsrud, V., Amico, R. & Thomas, R. J., 2017. Partnering with AI: how organizations can win over skeptical managers. *Strategy & Leadership*, 45(1), pp. 37-43.

Liebowitz, J., 2001. Knowledge management and its link to artificial intelligence. *Expert Systems with Applications*, Volume 20, pp. 1-6.

Ludik, J., 2019. *The Conversation Live Show Season 2 Episode 13 with Dr Jacques Ludik, Cortex Logic* [Interview] (26 March 2019).

Marcouse, I. Anderson, P., Black, A., Machin, D. & Watson, N., 2014. *The Business Book*. London: Dorling Kindersley Limited.

Maree, K., 2016. *First Steps in Research*. 2nd ed. Pretoria: Van Schaik Publishers.

Moldenhauer, L. & Londt, C., 2018. Leadership, Artificial Intelligence and the Need to Redefine Future Skills Development. In: P. Ravesteijn & B. de Waal, eds. *ECMLG2018 14th European Conference on Management, Leadership and Governance*. Utrecht: Academic Conferences & Publishing International Ltd, pp. 155-160.

Moscoso-Zea, O., Castro, J., Paredes-Gualtor, J. & Luján-Mora, S., 2019. A Hybrid Infrastructure of Enterprise Architecture and Business Intelligence & Analytics for Knowledge Management in Education. *IEEE Access*, Volume 7, pp. 38778-38788.

Moursund, D., 2006. *Brief introduction to educational implications of Artificial Intelligence*, Eugene: University of Oregon.

Nel, J. & De Beer, A., 2018. *Business Management : A Contemporary Approach*. 3rd ed. Cape Town: Juta and Company (Pty) Ltd.

Purdy, M. & Daughetry, P., 2017. *Artificial Intelligence is the Future of Growth*. [Online] Available at: <https://www.accenture.com/za-en/insight-artificial-intelligence-future-growth> [Accessed 4 May 2019].

Schwab, K., 2017. *The Global Competitiveness Report: 2017-2018*, Geneva: World Economic Forum.

Schwab, K. & Davis, N., 2018. *Shaping the Future of the Fourth Industrial Revolution: A guide to building a better world*. 2nd ed. London: Penguin Books Ltd.

Strydom, H., 2011. Sampling in the Quantitative Paradigm. In: A. De Vos, H. Strydom, C. Fouché & D. Rina, eds. *Research at Grass Roots*. Pretoria: Van Schaik Publishers, pp. 222-235.

University of Pretoria, 2018. *Unlocking the potential of research and innovation for the implementation of the Sustainable Development Goals in Africa..* [Online] Available at: <http://sasdgghub.org/about> [Accessed 31 October 2018].

Walczak, S., 2016. Artificial Neural Networks and other AI Applications for Business Management Decision Support. *International Journal of Sociotechnology and Knowledge Development*, 8(4), pp. 1-20.

World Economic Forum, 2017. *The Future of Jobs and Skills in Africa: Preparing the Region for the Fourth Industrial Revolution*. [Online] Available at: <https://www.weforum.org/reports/the-future-of-jobs-and-skills-in-africa-preparing-the-region-for-the-fourth-industrial-revolution> [Accessed 2 May 2019].

Xing, B., Marwala, L. & Marwala, T., 2018. Adopt Fast, Adapt Quick: Adaptive Approaches in the South African Context. In: N. W. Gleason, ed. *Higher Education in the Era of the Fourth Industrial Revolution*. Singapore: Springer Nature Singapore Pte Ltd, pp. 171-206.

Yukl, G., 1989. Managerial Leadership: A Review of Theory and Research. *Journal of Management*, 15(2), pp. 251-289.

ANNEXURE A: FINAL RESEARCH REPORT SUMMARY DOCUMENT

Title: The Knowledge and Leadership Behaviour from Business Managers in relation to Artificial Intelligence in Nelson Mandela Bay.

Research Purpose/ Objective	Primary Research Question	Research Rationale	Seminal Authors/ Sources	Theoretical Framework	Paradigm	Approach	Data Collection Method	Ethics	Key Findings	Recommendations
The research purpose focussed on the knowledge and leadership behaviour of leaders within NMB, with regards to AI.	Do current Nelson Mandela Bay business managers embrace artificial intelligence in relation to leadership behaviour?	Uncertainty of AI's future. The populist movement toward Industry 4.0. and knowledge management relationship.	Yukl, G. Schwab, K. and Davis, N. Liebowitz, J. Moldenhauer, L and Londt, C.	Theme 1: Scholarly theory. Theme 2: Leadership behaviour. Theme 3: Industry 4.0. Theme 4: Artificial intelligence. Theme 5: Knowledge management. Theme 6: Service Industry. Theme 7: Nelson Mandela Bay.	Positivism. Empirical and scientific evidence through the research was gathered. The results were objectively observable from the surveys. The research report discussed the reliability and validity. The heuristic value and implications of the research were evaluated.	Quantitative.	Cross-sectional survey design. Likert Scale and closed Questions.	Generalisability. Informed consent. Pod-sessions. A "Request to Perform Research" form from the IIE's Varsity College.	NMB business managers are embracing AI to an extent but still require further knowledge in this regard.	This research report has shown that periodic research is essential to further the body of knowledge into leadership and AI. Research into the traits' leaders require and the process of AI implementation in South African organisations are required.
						Population				
						Business managers, in leadership roles, residing in NMB, within the service industry.				
Research Problem	Secondary Questions	Key Concepts	Key Theories			Sampling	Data Analysis Method	Limitations	Key Contribution	
AI is a growing part of business across the world and in South Africa. Leaders are a fundamental part of AI adoption.	Do Nelson Mandela Bay business managers understand the benefits of artificial intelligence? Do higher-level managers embrace artificial intelligence more than first-line managers?	Leadership behaviour. AI. Industry 4.0. knowledge management. Business manager. Service industry.	Scholarly theory.			Non-probability sampling; Purposive, convenience and snowball sampling. 25 respondents.	Quantitative data analysis. The International System of Units. Excel and Google Forms will be used to process results.	Time and monetary constraints are the largest limitations. Success and method of AI integration will be researched.	The contribution is mainly aimed at the leadership behaviour of business managers in NMB.	

ANNEXURE B: LEADERSHIP AND ARTIFICIAL INTELLIGENCE (SURVEY)

Tiaan Jakobus Fourie,

Student at the IIE's Varsity College, Port Elizabeth. Contact me:
18006420@vcconnect.co.za

Your participation will not take more than 10 minutes. You may withdraw from the study at any time. Your answers and the company you work for will remain anonymous.

For clarification purposes:

Artificial intelligence is the automation or augmentation of tasks or jobs within an organisation.

Knowledge management is the efficient managing of information and resources to achieve organisational objectives.

Introduction Questions:

1 What is the managerial level of your position of employment at your organisation?

Mark only one oval.

- ☐ First-line Manager. (Operational/Supervision Role)
- ☐ Higher-level Manager. (Executive/Strategic Role)

2 Which sector of the service industry does the company you are a stakeholder of, operate in? Mark only one oval.

- ☐ Retail.
- ☐ Accounting.
- ☐ Healthcare.
- ☐ Information Technology.
- ☐ Financial Services.
- ☐ Banking.
- ☐ Education.
- ☐ Hospitality.
- ☐ Other.

Guidance Questions:

3 Which systems does the organisation utilise to assist employees in developing their skills? Check all that apply.

- ☐ Knowledge management system.
- ☐ Mentor-apprentice.
- ☐ Educational sponsorship.
- ☐ Workshops.
- ☐ Other.
- ☐ None.

4 Is there a knowledge management system in the organisation you are currently working for? Mark only one oval.

- ☐ Yes
- ☐ No
- ☐ Maybe / Unsure

5 Do employees utilise knowledge available to them from the organisation? Mark only one oval.

- ☐ Yes
- ☐ No
- ☐ Maybe / Unsure

6 What would allow you to trust advice from artificial intelligence? Mark only one oval.

- ☐ I understand how the system works and generates advice.
- ☐ The system has a proven track record.
- ☐ The system provides convincing explanations.
- ☐ People I trust use such systems.
- ☐ Advice is limited to simple rule-based decisions.
- ☐ Nothing would allow me to trust advice generated by an intelligent machine.

7 Which tasks would you be comfortable with when using artificial intelligence to manage your organisation? Check all that apply.

- ☐ Administrative.
- ☐ Strategic decision-making.
- ☐ Marketing.
- ☐ Employee engagement.
- ☐ Finance and accounting.
- ☐ Other.

Scale Questions:

To what degree do you agree or disagree with the following questions.

8 I would trust the advice of artificial intelligence in making business decisions in the future? Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

9 I would accept the responsibility of artificial intelligence's actions. Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

10 I am comfortable with artificial intelligence monitoring my work. Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

11 I am comfortable with artificial intelligence evaluating my work. Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	☐	☐	☐	☐	☐	Strongly Agree

12 The knowledge management system assists you in managing knowledge in your organisation. Mark only one oval.

	1	2	3	4	5	
Strongly disagree.	☐	☐	☐	☐	☐	Strongly Agree.

13 I have knowledge regarding the benefits of artificial intelligence in a business decision- making. Mark only one oval.

	1	2	3	4	5	
Strongly Disagree.	☐	☐	☐	☐	☐	Strongly Agree.

14 I have knowledge of the benefits of artificial intelligence in knowledge management. Mark only one oval.

	1	2	3	4	5	
Strongly Disagree.	☐	☐	☐	☐	☐	Strongly Agree.

ANNEXURE C: ETHICS CLEARANCE LETTER