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The Road Accident Fund's Readiness to Adopt Big Data

Moloko Moneatse

Student number:1792623

A research project presented to the University of the Witwatersrand's Faculty of Commerce, Law, and Management as a requirement for the Master of Business Administration degree.

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DECLARATION

I, Moloko Moneatse, declare that, unless otherwise noted in the references and acknowledgments, this consultancy report is my original work. It is offered in part-fulfillment of the requirements for the Master of Business Administration degree from the Graduate School of Business Administration at the University of the Witwatersrand in Johannesburg.



_____

Moloko Moneatse

Signed at Johannesburg

On the 28 day of February 2023

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To my wife, Thulibona, for the unwavering support and encouragement throughout this body of work, and my adorable children, Goratileone and Katlego, for understanding when I was not always available.

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To my colleagues at the Road Accident Fund, thank you for participating in the interviews and sharing your insights. Your positivity about and pride in restoring the social balance of road accident victims tell a lot. I learned so much from listening to you.

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ABSTRACT

With the fast proliferation of data in numerous formats and from various sources, businesses can transform raw data into information that helps them comprehend their consumers' demands. The utilization of large data sets enables firms to make data-driven decisions. Although public institutions acknowledge the benefits of adopting big data, they are hesitant to do so for a variety of reasons. Few studies have looked into the public sector's readiness to use big data. The current study looks into how open the public sector is to incorporate big data.

The Technology Organisation Technology framework was used to examine how various technological, organizational, and environmental factors influence the preparedness of big data in government agencies. The present study employed a qualitative approach to gather data through face-to-face interviews, to assess the key factors that contribute to the preparedness of big data in the public sector. Three technological aspects, including the readiness of Information Communication Technology infrastructure, data security, and data integration, have been identified as crucial for the public sector's readiness to utilize big data. The readiness of the public sector for big data adoption was dependent on three organisational factors: management support, budgetary assistance, and clarity of objectives. Three environmental elements were deemed critical for preparing for big data adoption in the public sector: public acceptance, service providers, and external attitude. The people context, the skill level of engineers, the acquisition of data scientists, and the analytical skill level of management significantly influenced the big data adoption preparedness of public organizations.

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
BDA	Big Data Analytics
ICT	Information Communication Technology
RAF	Road Accident Fund
TOE	Technology Organisation Environment
POPIA	Protection of Personal Information Act
TRA	Theory of Reasoned Action
TPB	Theory of Planned Behaviour
PBC	Perceived Behavioural Controls
TAM	Technology Acceptance Model
IDT	Innovation Diffusion Theory

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION AND BACKGROUND OF THE STUDY

Technological and social advancements have spawned several new digital apps and devices, as observed. Mobile devices, the internet, social media platforms, smart household appliances, corporate software, 4IR machinery and plants, and, more recently, smart cars produce more digital data than ever before. Both public and commercial enterprises transmit data in a variety of forms and rates via multiple mediums and technologies (Motau & Kalema, 2016). Hota et al. (2015) emphasised that vast quantities of digital data are accessible and expanding rapidly. Almost ninety percent of the data was generated globally in the last two years, according to Kim et al. (2014). The authors also noted that the globe generates approximately two-point five quintillion bytes of data daily, of which 90% are unstructured. The Fourth Industrial Revolution has made it essential for private and public companies to examine and obtain insights into their competitor to re-engineer their business models and operational procedures in order to gain a competitive advantage over their rivals.

Michael & Miller (2013) note that due to these drastic increases in the volume of data, it has become almost impossible to analyze such vast amounts of data since it is both structured and unstructured. These vast amounts of digital data, also called big data, and the evolution of data analytics have attracted much research in the past few years. Klievink et al. (2017) warned that big data is not a form of technology. Big data can be viewed as a collection of a large dataset that is varied and dynamic, so much so that conventional data processing and analytic tools cannot handle it (Klievink et al., 2017). Big data processing is cumbersome due to its variety, velocity, and enormous volumes of data (Kankanhalli et al., 2016). However, the utilization of cutting-edge technologies and this data type, a hybrid of both structured and unstructured, can be pooled and analysed, illuminating information that could not be extrapolated using traditional methods.

This data was formerly difficult to access, but advances in computing, storage, and analytical tools have made it readily available (Hota et al., 2015)

Evidence suggests that companies like Walmart and Amazon are leading Big Data attempts to better understand customers and influence decisions in purchasing. Mungai and Bayat (2018) attribute the success of the South African banking industry to the adaptation of big data. They further highlighted that all major banks have embarked on long-term big data transformation projects. With Big Data, Capitec (2018) established that their customers needed a better self-service option, longer operating hours, and open branch design, which saw an 83% increase in clients over five years. FirstRand Bank attributes its success to deep customer relationships and sophisticated data analytics.

The private sector has been widely acknowledged for its achievements in utilizing big data. However, the public sector, which encompasses state-owned entities, has not been able to keep up with the same pace of progress (Mullich, 2013). This is against substantial evidence that big data can potentially solve major public sector problems. The public sector has yet to take advantage of the many possibilities that big data can bring (Milakovich, 2013). He further went on to highlight that big data possesses the potential to help governments improve their service delivery initiatives. In her study, Nunu (2019) emphasized that the speed with which government can analyze and make decisions from these large and diverse datasets is contingent upon the centrality of its implementation. The author went on to say that this would allow the government to make better decisions and improve the efficiency and effectiveness of service delivery. According to Scholl and Scholl (2014), such benefits could effectively address persisting societal challenges, such as problems related to transportation, the provision of healthcare, road carnage reduction, and production of energy that is sustainable. Hlengiwe Mkhize, then-deputy minister of Telecommunications and Postal Services, was reported at the GTECH conference as saying, “We have been repeatedly reminded that the government possesses a growing quantity of data, especially big data.”

We can see that public institutions still need to make strides in implementing big data initiatives. It is suspected that public entities are delaying decisions and implementing big data programs because they are not yet ready to do so.

It could be argued that their systems and processes still need to be upgraded to reap big data's benefits. Public entities may be still deciding how to implement big data (Malik, 2013). Uncertainty about organizational readiness, as well as the inability to make precise judgments, is a significant challenge for public entities. It makes big data analytics more difficult to use. It raises the risk of hasty big data implementations, which would set a bad precedent.

As a result, the purpose of this study was to assess public entities' readiness for big data. Data from the Road Accident Fund (RAF) were used to inform the study, which was then qualitatively analyzed to determine factors related to big data readiness.

1.2 PURPOSE OF STUDY

The study's goal is to assess public entities' readiness for big data. The study's objectives are as follows:

1. To analyse whether the inability to accept big data is due to a lack of readiness for the use of public data.
2. To identify the of importance big data readiness elements.
3. To illustrate big data's worth within an organisation.

1.3 PROBLEM STATEMENT

The Road Accident Fund wants to conduct a pilot application of big data analytics to sort out their claim processing backlog and fraudulent claims issues that have plundered the entity into financial difficulties, however the adoption of big data is relatively low in all state-owned entities. The Road Accident Fund is looking at changing their claims processing to be more data driven, as the processing of claims take more time to finalise to do manual data gathering. As a result, road accident victims are disadvantaged due to delays in the settlement of claims, proper healthcare cannot be offered in time as a result due to lack of finances. It is evident in literature that organisations that adopted big data in their decision-making processes achieve higher levels of operational efficiency.

This generates interest in establishing the reasons behind public entities' failure or reluctance to adopt big data as compared to other state-owned entities of developed countries.

The lack of capacity and capability to handle big data within organisations has led to an inability to leverage the analytical prowess of big data analytics. Public sector companies that have adopted big data efficiently provide service delivery (Munné, 2016). Manyika et al. (2011) highlighted that public entities could control and mitigate fraudulent activities by adopting big data.

Nevertheless, with big data comes the challenge of effectively handling and analyzing it to obtain relevant meaning for decision-making (Michael & Miller, 2013). It can be suspected that public entities do not have the means to deal with large volumes of data, from different sources, in various formats.

1.4 RESEARCH QUESTION

With Big data making waves in the business world, public entities are yet to tap into the world of big data and the positive possibilities it can bring to public entities once adopted. To understand the scepticism to using big data, the researcher needs to examine big data preparedness in public bodies. The secondary questions for this study are:

1. How does a lack of readiness affect the ability to adopt Big Data?
2. What are the factors or elements of readiness for Big Data?
3. What is the role of Big Data in an organisation?

1.5 RESEARCH ASSUMPTIONS AND LIMITATIONS

1.5.1 Limitations of the study

The study was limited to only head offices only. The experiences of Head Office participants might be different from regional office employees. The results might be skewed because only a subset of the population was interviewed for the study.

They were selected using the selective sampling method. The responses might be biased as the researcher is well-known to the participants.

1.5.2 Delimitation of the study

The study is limited to only one state-owned entity and only the Head Office employees were considered for this study and that is due to budgetary constraints and limited resources.

1.5.3 Assumption

Organisational readiness and maturity models can be applied at different levels before technology adoption. The study assumes that the organisation is more mature to adopt big data.

1.5.4 Significance of the study

This study benefits both the Road Accident Fund as a government agency and the field of academia. To the Road Accident Fund, this study will outline factors that are critical for the successful implementation of big data and develop a framework for big data readiness. A big data readiness framework will maximise their prospects of successful implementation of bid data initiative to improve their operational efficiencies and mitigate is combating fraud in processing of claims. In the academic space, the study adds to the current literature of big data readiness in government owned entities. The study further contributes on how the Technology Organisation Environment framework was used to formulate a readiness framework for big data adoption.

CHAPTER 2

LITERATURE REVIEW

2.1 OVERVIEW

The section briefly reviews the literature on the subject under investigation to establish the trends in big data analytics and how other organisations are adopting it to revamp their systems and decision-making processes. The review also presents a framework that underpins this study. This chapter presents the concept of Big Data, its definition, and its applicability in the public sector; without putting too much emphasis on what big data is. We are only highlighting how big data can be used in organisations. This study is underpinned by the Technology Organization Environment framework (TOE)

2.2 BIG DATA

As a result of advancements in information and communication technology, data collection, storage, and processing have expanded significantly, resulting in a focus on processing enormous datasets (Fredriksson, Mubarak, Tuohimaa, & Zhan, 2017). Recently, academics have defined big data differently (Frizzo-Barker et al., 2016). The earliest definitions of big data were based on its properties. The literature and business and information technology periodicals reveal various reports on big data. According to Barham (2000), big data can be placed classified into three categories: big data as a concept, a method, and a tool for data analysis.

The distinguishing qualities of big data according to Hofacker et al. (2016) are volume, velocity, and variety, abbreviated as the 3V's. In the context of big data, the book refers to the amount of data in terabytes and petabytes (Gandomi & Haider, 2015). Variety refers to the numerous data sources from which data is obtained, such as sensors, social networks, mobile devices, RFIDs, and websites (Hashem et al., 2015). Instead, velocity is the rate at which data can be processed (Assunco et al., 2015).

A recent study on big data has improved its qualities by adding veracity and value, leading to their designation as the 5Vs. Figure 1 illustrates that illustrated in Figure, Assunco et al. (2015) describe the new classification as a multi-V model. Value refers to the benefit received by leveraging big data (Khan et al., 2019). Eventually, researchers added additional V's, including visualisation, variability, validity, vulnerability, and volatility (Li et al. 2020). In Figure 2.1, the 5Vs of big data are displayed.

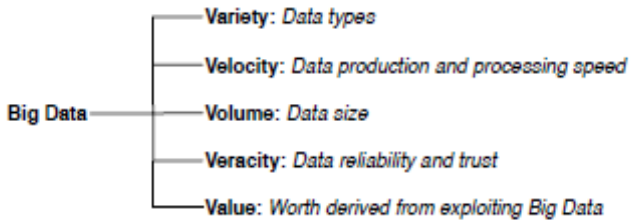


Figure 2.1*: The 5 Vs of Big Data (Assunção et al., 2015)*

In order to make judgements based on massive amounts of data, businesses require the appropriate information at the appropriate moment. Businesses and organisations collect or generate data from a number of sources, and often collect more data than standard data processing tools can handle. Data from a wide variety of internal and external sources, both organised and unstructured, is consumed and integrated by big data in a holistic approach to information management. Then, uncover their interrelationships and develop insights that enable comprehensive analysis and future forecasts, giving firms a competitive advantage over their rivals. Figure 2.2 depicts the data flow of an average big data system.

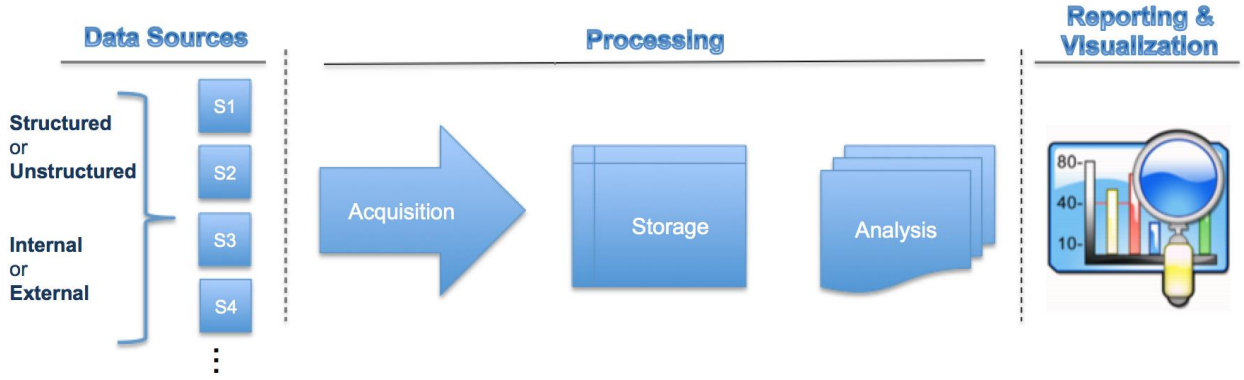


Figure 2.2: *Figure 2. Big Data as a Process (Barham, 2000)*

Alternative methods of handling large data as an entity are provided by big data by utilising advancements in storage and processing technology. Data can be stored in distributed storage systems that handle unstructured data correctly. To meet the processing needs of big data processes, low-cost processors can be clustered to provide faster processing power.

Abbasi et al. (2016) noted that we primarily focused most definitions of big data on the characteristics of big data. Other scholars included the analytical procedures, tools, and techniques employed. In contrast, others described the impact that big data analysis and presentation can yield regarding business value. This point was highlighted by Gantz and Reinsel's (2012) definition, it claims that the three key components of big data analytics are the data itself, the analytics used on the data, and the findings' presentation, which enables the production of commercial value. Some academics underline the method and tools needed to derive insights from big data by referring to it as "big data analysis." Big data analytics incorporates the entity upon which analysis is researched and tools, infrastructure, visualisation, and presentation (George et al., 2016). In as much as definitions of big data analytics cover a broader spectrum of elements that can be viewed as crucial to big data's success, they need to protect the organisational resources necessary to transform big data into actionable insight.

2.3 THE EPOCH OF BIG DATA ANALYTICS

Business intelligence (B.I.) has evolved into what is now known as big data analytics. It makes possible the use of sophisticated analytic methods on large datasets, something that was previously unattainable using only conventional information technology (IT) analytics tools Barham (2000). With big data analytics, massive volumes of data from different sources, which can be structured, semi-structured, or unstructured, can be analysed effectively. As illustrated in Figure 2.3, there was a shift in the analytical emphasis from looking back at the past to looking forwards to what might happen in the future and how businesses could take advantage of that.

According to Sivarajah et al. (2017), the process is not a straight line; moving from hindsight analytics methods to more advanced foresight analytics methods is not a smooth transition, and only a few organizations have succeeded.

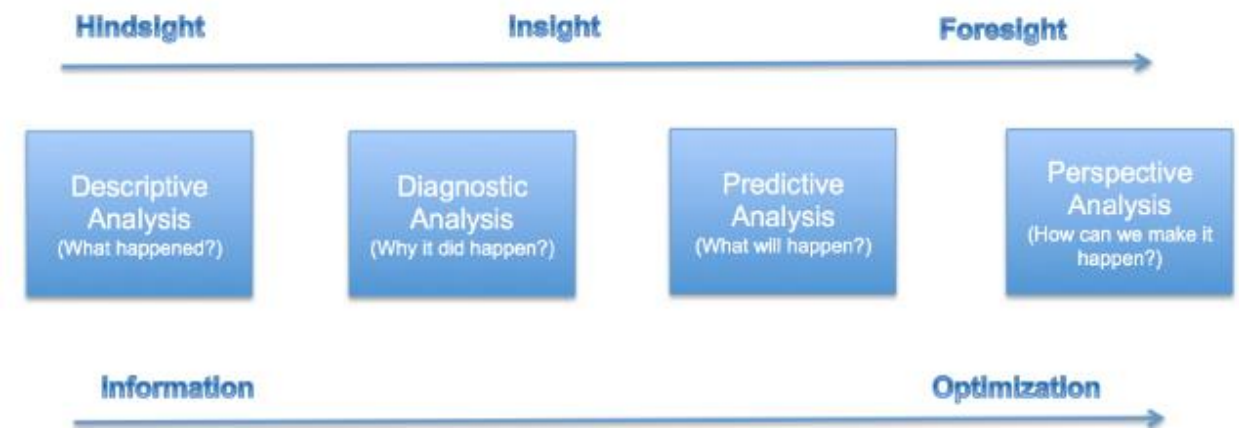


Figure 2.3: Big Data Analytics (Barham, 2000)

Businesses could be classified as per their degree of big data character and their application of big data analytics to make critical business decisions (Lavalle et al. 2011).

Aspirational: Big data adoption is limited among organisations in this industry. Efficiency and automation are the foundations of information technology.

Experienced: The automation and efficiency standards of these types of businesses have long since been satisfied. They concentrate on improving data collection methods and effectively incorporating and acting on data analytics to improve their organization.

Transformed: Organisations in this category have mastered the art of data analytics usage across a broad range of functions. They use analytics as their competitive advantage, and people, tools, and processes align with their data strategies.

The same study found that organisations in the transformed category outperform their peers in the same industry. This points to adopting big data analytics in their organisations.

2.4 BIG DATA: APPLICATIONS AND BENEFITS

Kim et al. (2014) noted that governments could use private organizations' strategies to pursue profits to promote the public good. It is noted that public entities consume added information technology revolutions to transform and expand their possibilities ever since information technology became a critical business enabler, albeit with varying levels of success, and the adoption of big data analytics would work similarly. Big data is already available to the government, as the former deputy minister of information pointed out (Mkhize, 2015).

Governments have the chance to use big data solutions to enhance efficiency, performance, and creativity in service delivery, claims the World Bank Group (2017). The United Kingdom government estimates that big data analysis saves them between $20 and $40 billion annually (World Bank Group, 2017). According to a study commissioned by Data Science, organizations that have implemented big data analytics have 41% better customer experience and 38% better decision-making. This section will look at some of the most significant public sector big data projects from the literature.

2.5 BIG DATA APPLICATIONS IN HEALTHCARE

Literature shows that big data has unlocked a new opening in healthcare thanks to considerable benefits and opportunities. Pointing to the IDC report, Pramanik et al. (2018) pointed out that although overall data is growing by 40% year-on-year, healthcare data is increasing by 48% in India. Healthcare professionals may make wise decisions by using big data analytics, such as coordinating the treatment of a patient who has many ailments, improving disease diagnosis, and obtaining a whole picture of the patient based on the family history.

Healthcare Big Data is changing the face of healthcare (Pramanik et al., 2018). They went on to say that doctors and nurses might utilise big data as a compass to make hospitals and clinics safer and better places to get treatment. Scholars have also noted that this will aid in learning about the health of the public, which is crucial for providing preventative care at the right times.

Raghupathi & Raghupathi (2014) postulated that adopting big data analytics in healthcare would help detect diseases at earlier stages. They further noted that adopting big data in healthcare would assist in scaling the quality and accountability of current medical and healthcare services. Other scholars listed the advantages discussed below:

Reduced the cost of healthcare: Dash et al. (2019) argue that if implemented properly, big data may reduce the cost of healthcare by over 25% annually. They further noted that better diagnosis and disease prediction using big data analytics could reduce costs by reducing hospital readmissions.

Public health: With big data, it would be easier to analyse disease patterns and respond quicker. Turning large amounts of data into actionable information that can be used to identify needs provides services and prevent crises, much to the benefit of the public (Raghupathi & Raghupathi, 2014)

Data sharing: Dash et al. (2019) highlighted that big data allows patients to receive care at multiple locations. To achieve this, sharing of data would be essential. Data sharing equips healthcare with key patient information to aid their decision-making regarding patient treatment strategies.

2.6 FRAUD DETECTION IN THE AGE OF BIG DATA

Fraud has always been an issue with far-reaching consequences worldwide, in the financial industry, government, corporate sectors, and ordinary consumers. New-age technology compounded the problem, such as cloud and mobile computing. In recent studies on fraud detection, many scholars, including Bhattacharyya, Benedek, et al. (2022), agree that traditional methods of fraud detection that rely on manual techniques, such as auditing, have been unreliable in solving the ever-problem. Financial fraud harms businesses and society. Bhattacharyya et al. (2011) noted that credit card fraud accounted for a trillion in financial losses.

Insurance fraud, however, is crippling the vehicle insurance market (Benedek et al., 2022). Referring to the Insurance Information Institute, Benedek et al. (2022) reported that the scale of fraud in the vehicle insurance industry exceeds 80 billion dollars annually.

Strategies alone cannot propel fraud detection and prevention; tools are needed to predict, detect, and respond to fraud. A study by MJV found that a hybrid of tools is machine learning platforms, big data, and artificial intelligence (A.I.).

The literature presents empirical evidence demonstrating how big data may provide value for enterprises and provide a competitive advantage. Big data is the "mother layer of disruptive change in a networked corporate environment," according to big data researchers (Abbasi et al., 2016; al, n.d.; Dash et al., 2019; Elgendy & Elragal, 2014; George et al., 2016; Kim et al., 2014). According to Chen et al. (2012), firms that have adopted big data technology would most likely experience industry-wide benefits. Ghoshal et al. (2014) cautioned that the value received from big data adoptions is contingent upon the strategic objectives stated before to adoption.

Government and public corporations can utilise big data to promote the participation of people in government matters, assisting in crime prevention and access to health care and educational services among others (Kim et al., 2014). It is anticipated that organisations that employ big data to drive their strategic objectives and day-to-day operations would surpass those that do not (LaValle et al., 2012). The majority of scholars concur that big data will assist businesses in enhancing their operational efficiency and effectiveness (Davenport, 2006; McAfee & Brynjolfsson, 2012; Chen et al., 2012). Constantinou and Kallinikos (2015) stated that implementing big data will improve decision-making.

2.7 READINESS ASSESSMENT

A readiness assessment is a systematic evaluation of a company's preparedness to implement a change or transformation. They stressed the need for a readiness assessment in identifying any barriers to implementing new systems, structures, and processes inside an already established business. Furthermore, if gaps in the organization are identified, the readiness assessment allows for the closure of those gaps prior to or as part of the implementation process” (HRSA, 2018).

Technology Readiness Assessment (TRA), developed by NASA in the mid-1970s for space exploration technologies, is one of the earliest methods of assessing technology readiness. It assesses technology maturity throughout the research, development, and deployment phases (Mankins, 2009). According to Barham (2000), the TRA considers technological and non-technological factors to determine a technology's maturity level and readiness for the next phase. As shown in figure 2.4, the technology Readiness Levels (TRLs) are iterated through 9 levels, with 9 indicating the most mature technology stage (Mankins, 2009).



Figure 2.4: Overview of the technology readiness level scale (Mankins, 2009)

To be deemed thorough, a readiness assessment must consider critical variables that are both internal and external to the organisation in order to increase the big data implementation chances in government institutions.

2.8 THEORETICAL FRAMEWORKS

Over the years, researchers have invested considerable time and effort in understanding how technological innovations are adopted in organisations. The body of work in research resulted in the development of many technology adoption frameworks (Lai, 2017). In this study, several theories were considered to get the most suitable theoretical framework for this study. In the next section, the researcher will summarise four views, their assumptions, core constructs, and their suitability for the study.

2.8.1 Theory of Reasoned Action

The theory of Reasoned Action (TRA) was developed by Fishbein and Ajzen (1975) in trying to explain human behaviour based on their behavioural intention, which is in turn influenced by their behaviour and perception (Kim & Crowston, 2011). Dillard & Shen (2012) posit that the TRA explains behaviours, not a wide spectrum of spontaneous, impulsive, and habitual behaviors. The authors noted that the TRA does not consider behaviors requiring special skills, unique opportunities, or resources. TRA posits that attitude and subjective norms are the primary constructs of people's intention to adopt and use technology (Kim & Crowston, 2011; Pedro et al., 2019). The attitude significantly influences the choice to adopt and continue to use technology (Bhattacherjee & Premkumar,2004). Previous studies show that subjective norms influence not only behavioural intentions(Hu et al., 2005; Viswanath et al., 2002), other constructs, including but not limited to satisfaction (Hsu & Chiu, 2004) and perceived usefulness(Venkatesh et al., 2003). While TRA has successfully explained and predicted behavior in various settings, it may not be the most suitable framework for understanding big data adoption. Big data adoption involves a complex set of factors that go beyond the individual level of analysis that TRA focuses on.

Figure 2.5 illustrates the Theory of Reasoned Action.

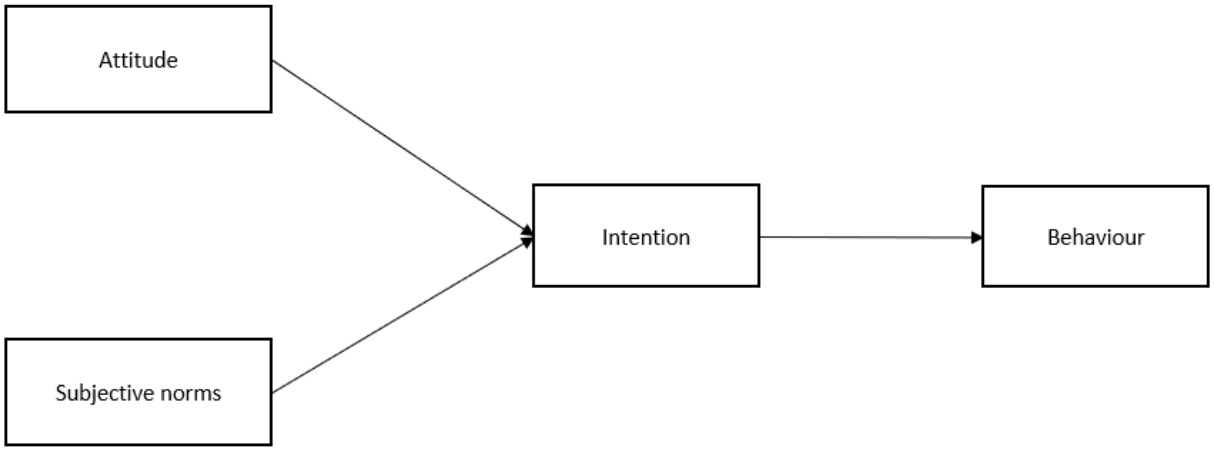


Figure 2.5:Theory of Reasoned Action (Dillard & Shen, 2012)

2.8.2 Theory of Planned Behaviour

As a continuation of TRA (1985), Ajzen suggested the Theory of Planned Behaviour (TBP). According to the TRA, certain significant beliefs influence behavioral intentions and subsequent behavior (Ajzen,1991). Ajzen expanded the TRA by adding a third construct, Perceived Behavioural Controls (PBC), which Ajzen (1991) defines as the user's perception of how easy or difficult it would be to act on behaviour. TPB has been used as a framework by ICT adoption scholars. There are three constructs in the theory: attitude, subjective norms, and perceived behavioral control (Kim & Crowston, 2011). According to research, PBC influences technology adoption intentions. The TPC is inappropriate for the study because it assumes that people are rational and have control over their actions. TBP is only interested in individual-level behavioral determinants such as attitudes, subjective norms, and perceived behavioural rules.

Figure 2.6 depicts the Theory of Planned Behaviour

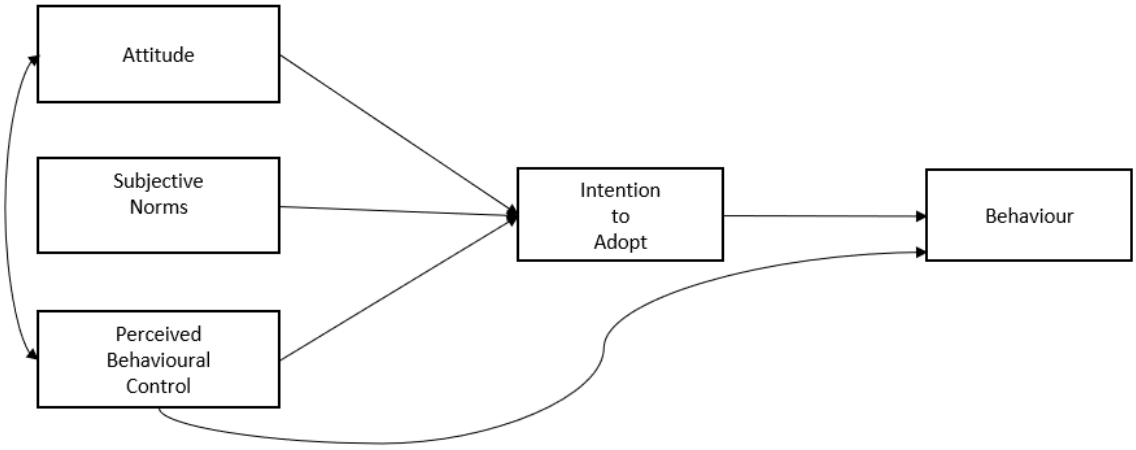


Figure 2.6:Theory of Planned Behaviour(Ajzen, 1991)

2.8.3 The Technology Acceptance Model

The technology Acceptance Model (TAM) was introduced by Davis (1989). TRA and TPB influence TAM and its extended models, and it focuses on adopting and using technology. Davis (1989) proposed TAM to explain the factors influencing user acceptance of a wide range of technologies. The author separated two constructs: perceived usefulness (PU) and perceived ease of use (PEOU). Scholars have confirmed that PU positively relates to technology adoption (Agarwal & Karahanna, 2000; Venkatesh et al., 2003). Both PEOU and PU have been found to influence satisfaction (Bhattacherjee & Premkumar, 2004). Although TAM is widely used in IT adoption, (Venkatesh et al. (2003) pointed out that it does not cater to non-organizational settings and overlooks the moderating effects of technology adoption. It can be concluded that Big Data is a complex technology that involves various components, such as data storage, data processing, and analytics. As a result, there are more complicated elements influencing Big Data adoption than there are for simpler technologies. TAM may oversimplify the factors that influence Big Data adoption, and it may not be able to capture the complexity of the technology.

Figure 2.7 depicts the Technology Acceptance Model

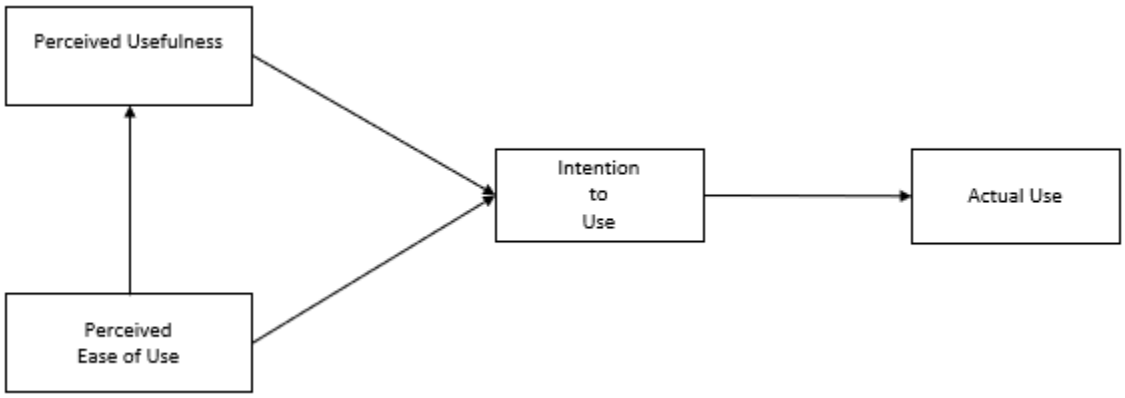


Figure 2.7: Technology Acceptance Model (Silva,1989)

2.8.4 Innovation Diffusion Theory

Rogers (1995) developed and refined Innovation Diffusion Theory (IDT) in 1962. The primary goal of IDT is to comprehend the diffusion of innovation in terms of four factors: time, communication channels, and social systems. IDT seeks to know how, why, and at what rate innovative ideas and technological adoption spread in a social system (Rogers, 1995). IDT takes a different direction from most other theories, and it sees change as primarily about the evolution of products, so they become better fits for the needs of people (Robinson, 2009). The model covers five critical factors that stimulate the user's intention to adopt innovation: complexity, relative advantage, compatibility, observability, and trialability (Ahmad Wani & Wajid Ali, 2015). The complexity of the Innovation Diffusion Theory can be defined as the extent to which an invention is regarded to be challenging to comprehend and implement (Sun et al., 2018). A new adoption's high complexity will stymie its adoption. IDT believes implementing innovation is a slow and gradual process that takes time (Fichman, 1992; Sun et al., 2018). IDT is not an appropriate paradigm for this study due to the complexity of big data and the sluggish adoption process.

Figure 8 depicts the Innovation Diffusion Theory.

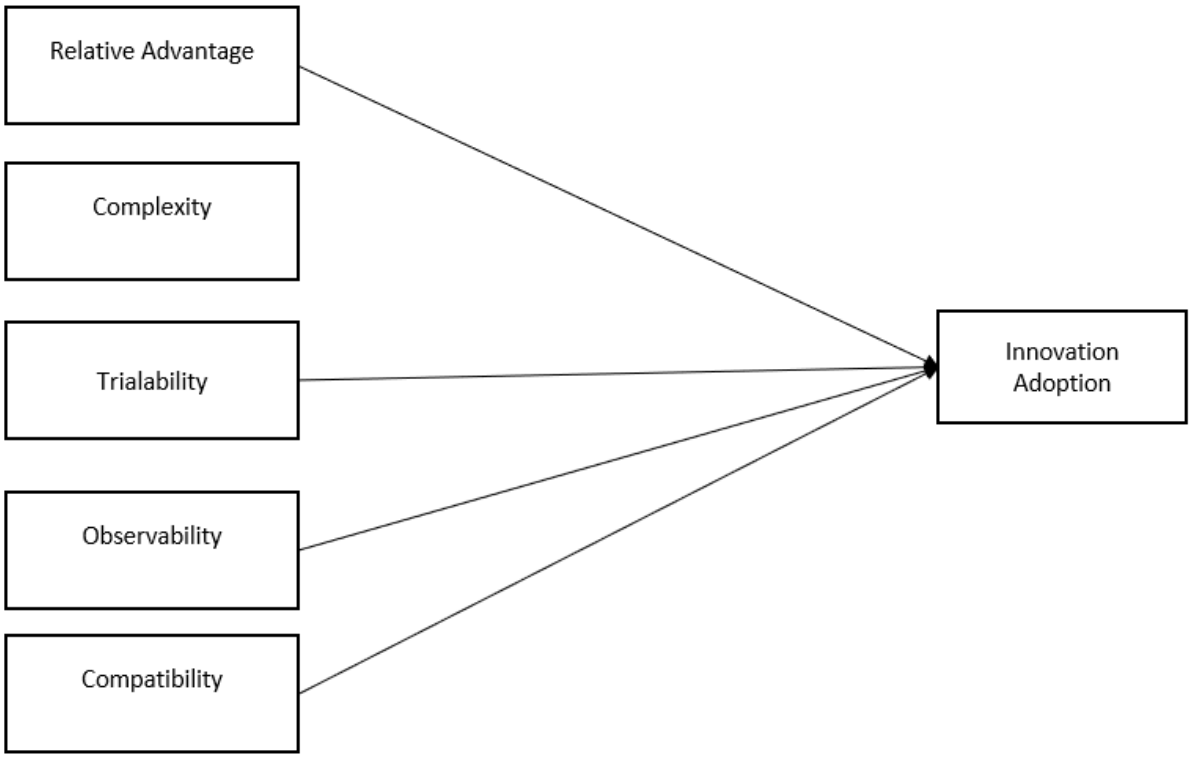


Figure 2.8: Innovation Diffusion Theory (Miller,1989)

2.9 FRAMEWORK FOR THE STUDY

The theories and models discussed in the previous section focus on technology adoption's psychological and behavioural aspects. Each theory has shortcomings; for instance, TRA does not consider behaviors requiring special skills, unique opportunities, or resources (Dillard & Shen, 2012). The IDT is unsuitable for this study as it does not cater to big data's complexities (Sun et al., 2018). Fichman (1992) posits that the diffusion of technological innovation is a slow-phased process. Modern innovations are implemented in a big-bang approach.

Although big data is a new phenomenon, scholars and researchers have covered the ground in terms of research, but more ground needs to be covered in terms of public sector readiness. (Barham (2000); Klievink et al., 2017; Ali et al., 2016; Olszak & Mach-Król, 2018) extensively covered notable work in big data readiness in the public sector.

The technology-organization-environment framework, better known as the TOE framework, was developed and published by Louis G. Tornatzky and Mitchell Fleischer in 1990 (Oliveira & Martins, 2011). Awa et al. (2017) postulated that, unlike traditional techno-centric models, TOE focuses more on organization-level factors. It is easier to tie adoption, use, and value creation with the TOE framework (Oliveira & Martins, 2011). Most scholars view the TOE framework as a framework of choice because it is encompassing and comprehensive compared to other technology adoption models. Oliveira & Martins (2011) posit that the TOE framework identifies three aspects of an enterprise's context that influence the process by which it adopts and implements a technological innovation:

Technological context: This section discusses the organizationally significant internal and external technology.

Organisational context: Relates to the organization's descriptive metrics. This looks at characteristics such as scope, size, and organisational structure.

Environmental context is where a firm conducts its business and deals with the government.

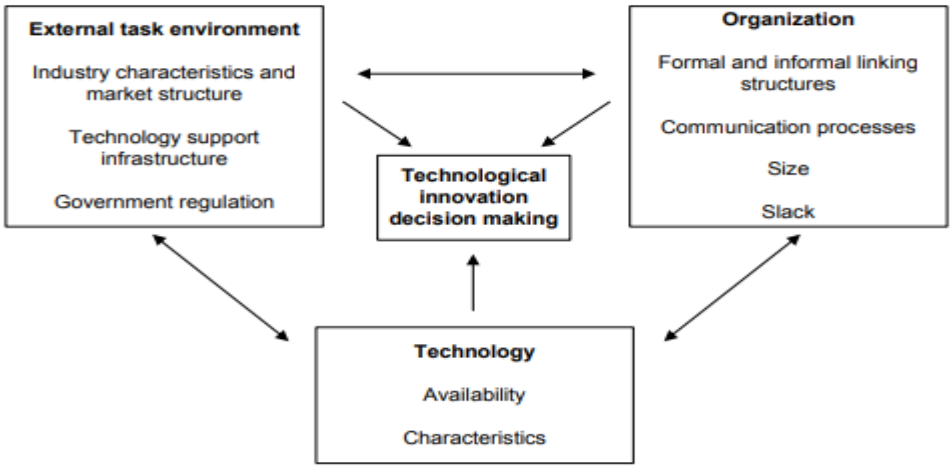


Figure 2.9: TOE framework (Tornatzky & Fleischer,1990)

TOE emerges as an important tool since it has a solid theoretical basis and applies to studying different types of innovation (Oliveira & Martins, 2011). While other frameworks focus on individual-level adoption, TOE focuses on organizational-level factors (Awa et al., 2017). The objectives inform the selection of the TOE framework of the study. The objectives of this study seek to determine critical factors that influence the success of big data implementation and adoption in public sector companies. We will look at technological, organizational, and environmental factors.

2.9.1 Big Data readiness factors

The elements that affect big data preparation have been the subject of many studies by academics and researchers. A preparedness framework for big data adoption in the public sector was presented by Klievink et al. (2017). Figure 2.6 depicts how the authors approached it from three perspectives: organizational alignment, organizational maturity, and organizational maturity. The organizational alignment was evaluated by classifying public sector entities based on their core function and current data activities. Their day-to-day activities were used to align organizations and big data. Each organization's organizational maturity was assessed based on its current data-sharing activities and usage. They established seven capabilities for organizational maturity. These seven competencies are data governance, IT governance, IT resources, internal big data attitude, external big data attitude, legal compliance, and data science expertise.

We saw from their conclusions that big data and its implications for each of the evaluated firms were fairly understood by each one of them. In terms of organisation, the organisation evaluated scored very low. This indicated a low level of collaboration, and little to no data sharing occurred. At the organisational capabilities level, it was found that although they have the capabilities for big data adoption, they need to be at the station for effective usage of big data.

Barham (2000) looked at four factors for successful big data deployment. Those factors are Personnel, Technical, Political, and Management. From a personnel perspective, he noted that employees' technical skills are critical because they must ensure that the

correct data is being pulled in. The correct data is fed into the system for analysis. He also emphasized the importance of public acceptance in a big data project. Management must have basic analytical skills to make sense of big data analytics.

Big data and its characteristics are what raise the technology challenge. The technology deployed must handle the enormous volumes of data fed into the systems. The organisational context discusses the factors that leaders should take into account to facilitate the long-term, sustainable use of big data inside organisations.

According to Barham (2000), organisational transformation might encounter a variety of challenges and opposition. Support from management is a crucial aspect in eliminating discrepancies. Moreover, management support expedites and trumps any existing bureaucracy preventing or delaying the transformation.

Based on the research on organisational big data preparedness, scholars (al, 2020.; Ali et al., 2016; Husin, 2019.; Kim et al., 2014; Klievink et al., 2017) emphasise the following as crucial success characteristics that influence big data adoption in the public sector.

a) ICT infrastructure

The most critical factor for adoption in the public sector is infrastructure(Zulkarnain,2013). Public sector entities must integrate all the datasets (Klievink et al., 2017) and standardized processes for all participating public entities to have a Big Data infrastructure.

b) Data security and governance

According to Moreno et al. (2016), data is today one of the most valuable assets for businesses across all industries. Disruptive technology brings new issues, and big data is no exception. It is not only the volumes of data that organizations need to take care of but another issue is also data security (Wang et al., 2015). Data protection in a big data context differs from data protection in a typical data environment, according to Salleh and Janczewski (2019). A compliance plan that involves process design, monitoring, and changing processes for privacy protection, security, and data ownership legislation is necessary for a successful Big Data adoption (Klievink et al., 2017).

c) Data integration

Janssen et al. (2017) refer to data integration as combining multiple data sets from different sources to gain better insights into data. Doan et al. (2012) defined the goal of data integration as “offering uniform access to a set of autonomous and heterogeneous data sources.” Data integration is already a challenge for a small number of sources, streaming enormous volumes of data from multiple sources.

Some seeds will be structured, some semi-structured, and others will be completely unstructured. In big data, data will belong to the same administrative entity. As a result, data integration will play a pivotal role in the spread of big data.

d) Management Support

Management support is defined in this study as the extent of senior management support and commitment to big data adoption and deployment (Ahmad Salleh et al., 2016). In technology adoption programmes, upper management controls enterprise resources and makes business decisions. Directly or indirectly, upper management influences the adoption of IT innovation within a business. Management support indicates a willingness to spend resources and facilitate the first adoption of future changes by senior management and executives. Financial and technological resources will probably be made available for the adoption of big data with the support of top management (Park et al., 2015). Prior study on IT adoption has revealed that the backing of senior management is a crucial component in promoting the adoption of IT innovations (G.-H. Kim et al., 2014; Lee et al., 2014; Premkumar & Roberts, 1999).

e) Clarity of objectives

The objective of the undertaking must be clear and how it relates to the whole organizational future goals(Barham, 2000; Klievink et al., 2017)

f) Financial readiness

According to Yin (2015), financial preparedness refers to an organization's availability of funds for big data adoption. Previous studies have demonstrated that financial support is critical for adopting big data (Oliveira et al., 2011). Big data projects are costly. This might be an issue in a developing and democratic country where decision-making is not centralized. Cost is mostly associated with infrastructure acquisition, technology, and service providers that are leaders in big data implementations.

g) Public

The public determines whether they think the project is good. Because taxpayers are the project's sponsors, they must be informed of the initiative's benefits (Barham, 2000).

h) Service providers

The organization must appoint vendors and service providers with proven experience in big data adoption. The preferred service providers must walk this journey with the organization. Baig et al. (2019) and Villars et al. (2011) highlighted the importance of onboarding vendors that offer technical support post-implementation. A clear vision and sound business case should include current business needs and be scalable enough to support future business requirements.

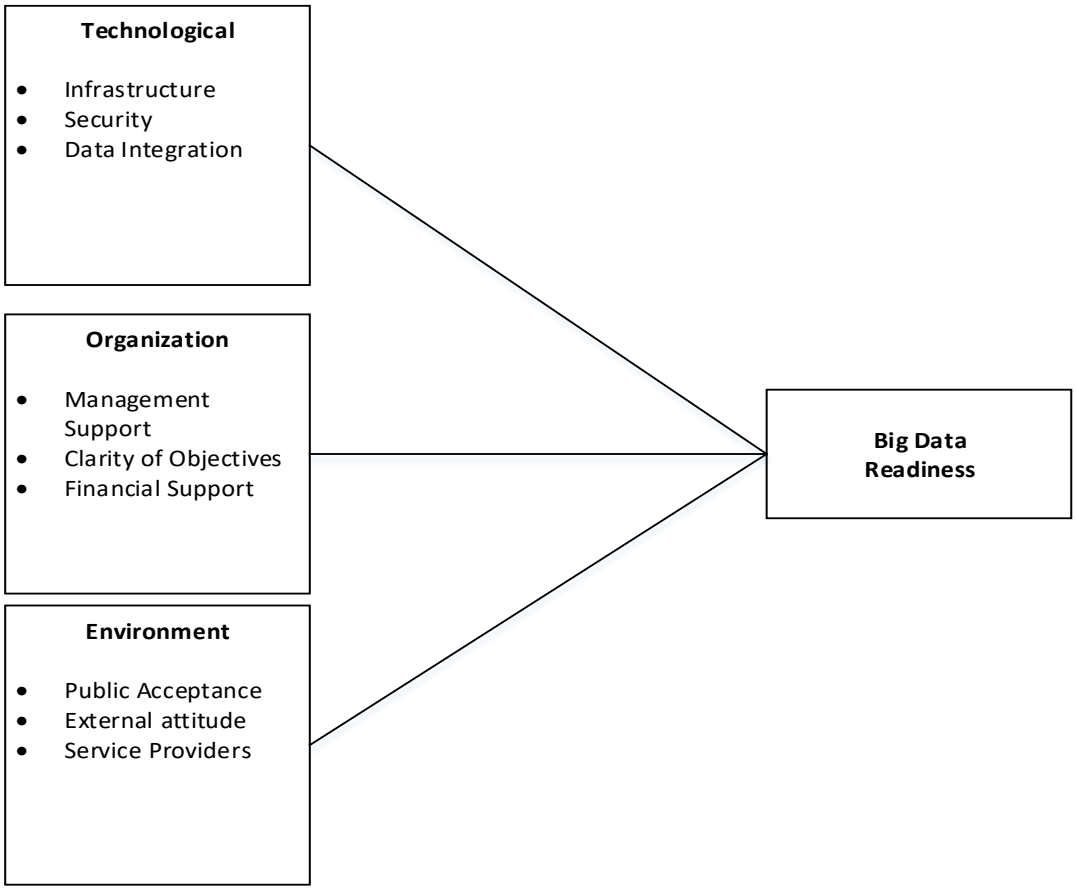


Figure 2.10: Proposed Big Data Readiness Framework: adapted from (Tornatzky & Fleischer,1990)

2.10 Research Propositions

Research Propositions

According to Avan (2001), research propositions are the cornerstone of research, and to a larger extent, the validity of a research study is determined by the criteria of its assertions. For this study, the Technology-Environment-Organisation (TOE) is the chosen framework to determine the critical factors for Big Data readiness at the Road Accident Fund.

The following propositions were formulated based on the three constructs of the TOE framework.

Proposition 1

The adequacy of Information Communication Technology (ICT) resources, which includes hardware and processes was found to be critical in technology adoption processes (Sun et al., 2018). Olama et al., (2014) posit that organisations that are in the process of adopting big data ensure that employees have the necessary skills and knowledge of big data. Technology preparedness, often known as technology competence, involves both technological infrastructure and IT expertise (Sun et al., 2018). It is for that that reason the following proposition was constructed:

P1: Technology readiness is a critical factor for the readiness of Big Data adoption.

Proposition 2

Scholars and researchers have adopted the TOE framework for the Information Technology adoption project. There are overarching variables that are categorised under

the organisational context of the TOE framework. Top management support and financial backing were found to be critical for the successful implementation of big data projects (Hsu et al., 2019; Lee, 2017; Oliveira et al., 2011). Barham & Daim (2020) warned that without clear objectives, the chances of success are slim.This has led to the formulation of the following proposition:

P2: Organisational readiness is critical for the readiness of Big Data adoption.

Proposition 3

Considering that Big Data is a new phenomenon for most organisations especially in developing countries, it is important to onboard service providers and external vendors that are knowledgeable in Big Data projects.

P3: Environmental readiness is critical for the readiness of Big Data adoption.

2.11 SUMMARY

Big data readiness has been reviewed as part of this literature review chapter. Firstly, the concept of big data and its definitions were presented. Secondly, the applicability and benefits, particularly in the public sector, were interrogated—prominent theoretical frameworks on technology adoption models and their suitability for this study. Based on the literature, factors that are critical for big data readiness were identified. Finally, a theoretical framework based on the identified factors was formulated. The research approach will be explored more thoroughly in the following chapter.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 METHODOLOGY

The research methodology is "the path through which researchers conduct their research" (Sileyew, 2019). It is the full presentation of how a researcher formulates their objectives and problems and presents their findings from the data they would have collected during their study period. A research methodology describes and analyses the methods used by a researcher and gives justification for why certain techniques were used over others. This section briefly explains the research method employed in this study.

Below is a visual representation of the research methodology followed in this study.

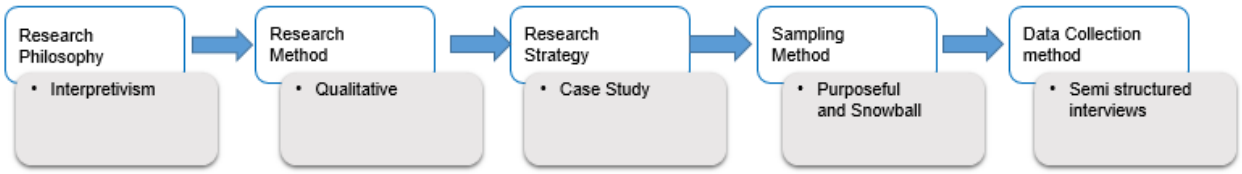


Figure 3.1: Research Methodology

3.2 RESEARCH DESIGN

The research design is a conceptual framework within which research is conducted, providing a structure for data collection and analysis (Kothari, 2004). The research design provides a framework for the study, enabling the efficient execution of numerous research procedures. The research design illustrates how all significant components work together to solve the research question (Trochim, 2007).

In this study, a case study research design was utilised. The case study is one of the most prevalent qualitative research approaches (Yazan, 2015). We consider it a potent research technique because it enables the researcher to explore a phenomenon in its real-world setting using many evidence sources (Zainal, 2007).

A case study offers a researcher an in-depth insight into situations and the meanings associated with those involved (Algozzine & Hancock, 2016). When detailed and in-depth research is required, a case study is perfect. It aims to expose details from the participants' point of view (Tellis, 1997). The case study used a public entity known as the Road Accident Fund (RAF). The entity was tracked down for the following reasons:

- RAF is charged with the responsibility of compensating road accident victims. The current business model of the scheme is not sustainable as the system is currently sitting on over an R600 billion Rand deficit. The RAF's revenue is insufficient to meet its liabilities, so the deficit is expected to grow. Litigating law practitioners cost the entity lots of money that should be used for claims settlements.
- The claims settlement process takes longer because the entity has not revamped its claim processing. A paper-based process usually causes delays; claims documentation is still submitted in paper form. The entity has many direct primary stakeholders, but there has not been any progress in data integration. That is one of the reasons claims are not settled in the mandatory 180 days as required by law.
- The entity is losing over R300m annually due to fraudulent activities in the claim management process. The controls are not stringiest enough to filter out fraudulent claims.
- Over 25% of the annual budget goes towards litigations, which breed the entity's corruption.

3.3 Research Philosophy

This study follows the interpretivism research paradigm. Saunders, Philip, & Thornhill (2009) define research philosophy as the "development of knowledge and the nature of the knowledge. Assumptions and beliefs regarding perception of the world influence the researcher’s understanding of knowledge development (Creswell, 2007). Saunders et al. (2011) identify four research philosophies: positivism, realism, interpretivism, and pragmatism.

Positivism is a widely held philosophical paradigm among social science researchers; it maintains that science or knowledge creation should be limited to what can be observed and measured (Bhattacherjee, 2012). The emphasis is on quantifiable observations leading to statistical analysis. This theoretical perspective assumes independence between the researcher and the research subject (Saunders, Philip, & Thornhill, 2009). Realism is a philosophical paradigm like positivism; it is a scientific inquiry highlighting the realities projected by human senses as truth. It argues that objects exist independently from the human mind. Realism has two dimensions: (1) The *direct realist* claims that what humans perceive through the senses is real. (2) The *critical realist* believes that what humans perceive through the senses is not the actual objects but pictures (Bhattacherjee, 2012; Saunders et al., 2011). Interpretivism advocates the importance of understanding humans as social actors (Walsham, 1995). The approach intends to understand "the world of human experiences" (Cohen, Manion, & Morrison, 1994). Research grounded in this approach relies on the participant's views of the phenomena studied (Creswell, 2007), and the researcher makes sense of or interprets the finding (Creswell, 2007). Interpretivism studies predominantly use qualitative data collection methods and analysis.

Creswell (2007) points out that the interpretivism research goal relies considerably on the participant's views. This contrasts with positivism philosophy, which advocates for the independence of the researcher and the object of inquiry. Walsham (1995) argues that interpretivism and qualitative methods are gaining ground in information systems (I.S.) studies as they present different perspectives on positivism and quantitative methods. Orlikowski & Baroudi (1991) emphasise that interpretive philosophy is popular in many social science fields, these include organisational studies. Bhattacherjee (2012) points out that interpretive research is well-suited for studying complex social processes where quantitative data may be biased. For those reasons, it can be concluded that interpretivism is the most suitable approach for the study.

3.4 RESEARCH APPROACH

In this study, an inductive approach was followed. Saunders et al. (2011) identified two research methodologies, inductive and deductive. In inductive research, the researcher seeks to infer theory concepts from the observed data. The inductive approach involves building a theory. In deductive research, the researcher uses empirical data to test ideas from theory. Bhattacherjee (2012) highlighted that theory testing covers theory improvement, refinement, and extension. (Saunders, Philip, & Thornhill (2009) further highlighted out the inductive approach comprises a collection of data and theory development using results from the analysed data.

3.5 RESEARCH METHOD

This study makes use of the qualitative research method. Research methods give the researcher the framework for collecting, analysing, and interpreting data when undertaking a research study (Haddadi, Hosseini, & Olsson, 2017). Punch (2003) noted that it is essential for the researcher to select suitable methods to achieve the research objectives. Research methods are categorised into quantitative, qualitative, and mixed methods. Qualitative research is a scientific method for investigating phenomena using non-numerical data.

On the other hand, quantitative research is a scientific method for investigating phenomena using numerical data (Bhattacherjee, 2012). In most cases, it identified the difference between qualitative and quantitative research using words rather than numbers or close-ended questions rather than open-ended questions (Saunders et al., 2011). A combination of approaches such as quantitative and qualitative is recognised as mixed methods (Creswell, 2009). The table below highlights the characteristics of quantitative and qualitative research.

Table 1: Characteristics of Quantitative and Qualitative Research

Quantitative	Qualitative
Literature review plays a significant role	Literature review plays a minor role
Description of the research problem through trends and explanation of variables	Exploration of the research problem and developing an understanding of a phenomenon
Measurability and observability are crucial elements	Measurability and observability are not essential elements
Collection of numerical data from a large population	Collection of non-numerical data from a smaller population
Use of statistical analysis to analyse trends	Use of text analysis to analyse data
Taking an objective and an unbiased approach	Taking a subjective and biased approach
Following a fixed structure when writing the research report	Using flexible structures when writing the research report

The study's goal is to identify the building blocks for public entities' readiness to adopt big data. The researcher had to engage respondents to understand their thoughts and attitudes toward big data analytics to achieve this. Saunders et al. (2011) point out that the objectives of the qualitative research method are to explore and describe. The researcher will collect non-numeric data from respondents using interviews. According to Olds et al. (2005), a qualitative research method tests written data such as output produced by interviews. In this study, interviews will be conducted to gather data from respondents.

3.6 RESEARCH STRATEGY

The study made use of the case study research strategy. Saunders et al. (2009) define the research strategy as the plan followed by the researcher to answer the research question. Creswell (2009) states that research strategies are the models that guide research design.

According to Bhattacherjee (2012), it is critical for the researcher to choose a design approach that will help answer the research questions. According to Verschuren et al., the existing knowledge guides 2010, the choice of the research strategy, the philosophical worldview, times, and other resources. Saunders (2011) identified the following research strategies: Experimental, Survey, Archival Research, Case Study, Ethnography, Action Research, Grounded Theory, and Narrative Inquiry.

Experimental research is commonly employed in the natural sciences and social sciences. Its goal is to investigate the causal relationships between two variables and whether changes in one effect change in the other (Saunders et al., 2009). Independence is maintained in assessed variables to ensure the reliability of results (Creswell, 2009). Responding to why and how questions suit the use of exploratory and explanatory research. The approach is used frequently on captive populations. The samples used are small and atypical (Saunders et al., 2009). The strength of the Strategy is in the strong internal validity due to isolation, control, and intensive examination of variables. The weakness is in the limited external generalizability. Data are analysed using the quantitative method (Bhattacherjee, 2012).

A survey is linked mostly with the deductive approach. The Strategy answers what, where, and how questions. Because of the questions, it seeks to respond to, the process tends to be used in exploratory and descriptive research. The popularity of the survey strategy is attributed to the ability to collect large amounts of data from a large population economically. The data is usually collected using questionnaires and structured interviews. The data collected can be used to study relationships between variables and the production of models. The Strategy allows for the generalisation of findings representing the entire population at a lower cost (Saunders et al., 2009). External validity is the strength of field surveys due to the ability to capture and control significant variables using multiple theories. The Strategy's weakness is that it is subject to respondent biases, negatively affecting internal validity. Data is analysed using a quantitative method (Bhattacherjee, 2012). Archival Research refers to documentation. Administrative records and documents are the primary data source. The research strategy answers questions focusing on the past and changes observed over time.

The approach is used in descriptive, explanatory, and exploratory research. Access to records and documents restricts the ability to answer research questions (Saunders et al., 2009).

An approach known as inductive as well as anthropology is the foundation upon which ethnography is established. The research strategy aims to describe and explain the social world inhabited by the research subjects from their perspective. It takes a long time to complete the research using this strategy. The researcher needs to be an integral part of the social world researched. Flexibility and responsiveness of the research process are key since new thought patterns are always developed. The Strategy is naturalistic; this implies that the researcher must first find a suitable setting to answer the research question and build trust with participants (Saunders et al., 2009). The connectedness of the researcher and the environment is the advantage of this approach. The approach demands many resources and takes time. Observational techniques are primarily used to collect data (Bhattacherjee, 2012).

Action Research strategy takes the position that social phenomena should be studied by introducing actions into the wonders and making sense of the effects of actions. The researcher initiates a step in the environment based on a theory in response to a problem. The researcher could be internal or external to the environment. The results are observed and improved to solve the problem. To solve issues, the strategy is iterative. Problem-solving and the generation of knowledge are the key features of the method. The Strategy is suitable for studying unique social problems but is susceptible to researcher bias and subjectivity (Bhattacherjee, 2012).

Grounded Theory is used for theory building, combining the inductive and deductive approaches. The name dropped derives from interpretations of observed empirical data (Bhattacherjee, 2012). The Strategy is instrumental in predicting and explaining behaviour. The framework of theory and its development is preceded by data collection. Data plays a crucial role in theory development. The dominant characteristic of the Strategy is the constant comparison of data with developing models to perfect the theoretical framework (Creswel, 2009).

Grounded Theory is messy and imperfect (Saunders et al., 2009). The approach is validated by comparing the developed theory and raw data (Bhattacherjee, 2012).

Narrative Inquiry researchers seek to understand real-life experiences and present findings through stories. It uses storytelling techniques to communicate results to the audience (Wang & Geale, 2015). The effectiveness of narrative inquiry is seen in individual and social transformation. Narratives are essential in the construction of ideas. People better understand themselves through storytelling. Stories are personal as well as social (Smith, 2011).

A case study is also called case research; the Strategy is used to study a phenomenon in its environment over time in one or more sites. It answers the questions of why, what, and how (Saunders, Philip, & Thornhill, 2009). Data collection methods used by the strategy include observations, interviews, and pre-recorded and secondary data. The data collection techniques can also be used in combination. The Strategy can be used in either an interpretive or positivist manner. In interpretive, the constructs may emerge as the research progresses, and research questions can be modified as the investigation progresses.

The Strategy allows for studying the phenomenon in an individual and organisational context. The approach has no experimental control; this makes the internal validity weak. This issue can be addressed using natural rules (Bhattacherjee, 2012). Lune & Berg (2016) point out that there are two dimensions of case studies, the holistic case versus the embedded issue; and the single case versus several cases. When investigating a unique occurrence or when there is little research on the topic, a single case is employed. Multiple cases involve more than one case; therefore, it is used to identify recurring findings. The holistic case refers to researching the entire organisation, and the researcher treats the organisation as one unit. The embedded case is when the researcher examines sub-units in an organisation (Saunders et al., 2009).

3.6.1 Case study description

The Road Accident Fund (RAF) is a government agency responsible for compensating road accident victims. The organisation's head office is in Pretoria; regional offices are in Gauteng, Western Cape, Kwazulu Natal, and Eastern Cape; the rest of the provinces have Customer Service Centres. The organisation is structured in a functional setup, with eight departments and about 2900 employees. Regional Offices have operations teams (core business) and a few support personnel providing business support services. All executives are based at the Head Office, heading operations and support departments. The ICT department is an in-house department based at the Head office, with support staff doing customer support at the regional offices. A couple of ICT functions have been outsourced to third parties.

Data management structures are very solid. Business Intelligence (B.I.) and reporting functions are spread across business units. The Operations department is at the entity's core business, and they have a reporting system to monitor its performance. The strategy department uses data to get insights and drive and monitor the strategic performance objectives of the entity. However, the entity only relies on internal data for decision-making. There are no strategic partnerships or proper stakeholder relationship frameworks to allow seamless data exchange for efficient claim processing. For example, The Road Traffic Management Corporation (RTMC) and the South African Police Service (SAPS) record road accidents, emergency services record the details of road accident victims, and hospitals will provide the condition and severity of injuries sustained by road accident victims. Applying big data expertise, RAF could gather information about a road accident scenario before the claimant approaches the entity. This claim processing turnaround time would be greatly reduced. Big data would give greater insights into processing and analysing data from different sources. As a result, fraudulent claims would be mitigated to a larger extent. A data-driven decision-making process allows the organisation to improve its operational efficiency.

3.7 DATA COLLECTION METHOD

According to Frechtling et al. (2002), data collection is an important part of the research process because it "provides a trade-off between breadth and depth, and between generalizability and targeting to specific (sometimes very limited) populations." The most commonly used techniques in a qualitative research study are interviews, observation, and documentation Mack et al. (2005). Interviews are meaningful discussions between parties that help the researcher collect valid and reliable data that is related to the study question and purpose (Mark, Philip, & Adrian, 2009). Creswell (2009) notes that in qualitative interviews, participants are interviewed by the researcher using face-to-face, telephonic, or focus group sessions. Bhattacherjee (2012) adds that interpretive research can use various data collection techniques, and the most frequently employed technique is interviewing. Interview questions are intended to gather views and thoughts from participants. Saunders, Philip, & Thornhill (2009) pointed out three types of interviews: structured, semi-structured, and unstructured.

Structured interviews are also referred to as interviewer-administered questionnaires and quantitative research interviews. The discussions are based on standardised questions used to collect quantifiable data in chronological order (Longhurst, 2006). In a structured approach, the researcher establishes what they need to find out in advance (Bryman, 2016). On the other hand, semi-structured and unstructured interview questions are not standardised; these are used to collect qualitative data (Saunders et al., 2009). In these approaches, the researcher comes in with an open mind and allows theories to emerge from the responses provided (Bryman, 2016).

The researcher selected the case study strategy. According to Bhattacherjee (2012), case study research is an in-depth investigation into a topic in a real-life setting, with data obtained through interviews. Kvale (1981) defines qualitative research interviews as gathering descriptions of the respondent's world and interpreting the phenomena from the respondent's view. Hove & Anda (2005) define interviews as one-on-one discussions between an interviewer and the respondent to collect information on a specific topic. In this research, the interviewer needs to gather information from the respondents to know what they think about the benefits of big data analytics.

This is conducted to generate rich data. Researchers highlighted that face-to-face interviews are a more personalised way of collecting data from participants because the interviewer can clarify issues raised by participants and ask probing questions.

To ensure a more personalised approach, the researcher intends to conduct face-to-face interviews, which an electronic recorder will record. Permission to record the responses will be sought from the participants. Face-to-face interviews have the advantage of social cues, such as body language, voice, and intonation; the social cues can give the interviewer additional rich information (Opdenakker, 2006). These interviews will be unstructured, even though the researcher will use an interview guide to help with follow-up questions and keep the interviews focused.

The disadvantages of unstructured interviews are that they are subject to varied interpretations of questions, answers, and conversation topics. Recording and discussing all interview information is not possible making it possible to leave out some important information essential to answering the research question. Different interview results are not comparable owing to the flexibility to which each interview is subjected. As a step in the exploratory research, this does not pose a difficulty because the priority in this research step is gathering information and developing insights.

3.8 DATA COLLECTION STEPS

In this study, the researcher used purposeful sampling alongside snowballing sampling for cases where it is applicable. Palinkas et al. (2015) point out that purposeful sampling is used extensively in qualitative research to yield information-rich cases while effectively using limited resources. Bhattacherjee (2012) defines snowball sampling as a non-probability method where currently enrolled research participants help recruit future subjects for a study.

The researcher used unstructured interviews as the main data collection instrument for the study. The sample of participants will be drawn from employees of RAF who shall be affected the most by adopting big data analytics. Before conducting the interviews, the

researcher will seek permission from relevant bodies and authorities. The ethical clearance from the University of Witwatersrand will be applied for approval.

3.9 POPULATION

RAF has over 2900 employees, and big data adoption will impact everyone in the organization. The population is spread across all provinces in the country. The regional offices consist of a Regional General Manager (RGM) and senior claims managers responsible for handling all the claims submitted to their offices. Only Head Office managers from ICT, Operations, and Strategy will participate in the case study.

3.10 SAMPLE

Parasuraman, Grewal, & Krishnan (2006) define sampling as selecting a small part of the population under investigation to draw general conclusions about the whole population. Bhattacherjee (2012) points out that available findings are about the observed common patterns in the behavior of the selected sample.

Only Head Office managers from ICT, Operations, and Strategy will participate in the case study. The other regional offices cannot be a part of the study due to financial constraints on the researcher's interest. The participants for this study shall be selected based on their accessibility. Saunders et al. (2009) point out that researchers operate under time and financial constraints and therefore choose a suitable sampling method to get a manageable number of participants. The researcher identified and selected individuals in the organization knowledgeable about Big Data usage. Participants' knowledge and experience are significant in determining participants in purposeful sampling (Palinkas et al., 2015). It is for this reason that the researcher opted for a purposeful sampling method. However, the main selection criteria of participants will be based on availability, wiliness to participate, and the freedom to share opinions and experiences with the researcher.

Table 3.2: The characteristics of the sample

Position and Department	Total
Managers	**10**
Forensics	1
Human Resources Management	1
Information and Telecommunication Technology	4
Operations	4
Specialist	**15**
Information and Telecommunication Technology	6
Internal Audit	2
Marketing	1
Operations	6
Senior Managers	**5**
Information and Telecommunication Technology	3
Operations	2
Grand Total	**30**

3.11 DATA ANALYSIS

Once the data is collected, researchers analyze it (Aronson, 1995). According to Cuellar (2018), data analysis brings order, structure, and meaning to the mass of collected data. It is described as messy, ambiguous, and time-consuming but also as a creative and fascinating process. This study will use thematic analysis to analyze the collected data. Thematic analysis is one of the most common methods used in qualitative research. It emphasizes identifying, analyzing, and interpreting patterns of meaning (or "themes") within qualitative data (Braun, Virginia; Clarke, Victoria, 2019), unlike other analytic approaches that might be regarded as methodologies like grounded Theory. Thematic analysis is seen as a method of analysis. Themes are developed through coding, which identifies items of analytic interest in the data and assigns them coding labels.

The thematic analysis goes beyond counting phrases or words in a text to deciphering meanings within the collected data (Braun et al., 2019).

3.12 ETHICAL CONSIDERATIONS

The researcher obtained ethical clearance from the Research Ethics Committee at the University of Witwatersrand to proceed with the research (WBS/BA1792623/938). The researcher also received approval from the entity's Chief Executive Officer (ACEO) to conduct the study and gather data through interviews. In addition to the support from the ACEO, the ICT General Manager granted permission for the researcher to proceed with the survey; this was in line with the Entity's Learning and Development policy.

All researchers need to be aware of research ethics. Ethics relates to two groups of people; those conducting research and the "researched upon" that have basic rights that should be protected. The researcher ensured that all the set ethical guidelines were followed throughout this study. In this study, the following ethical principles will be followed. First, respondents will be requested to express their consent to participate in the study. Secondly, the researcher will take all steps to ensure no harm to the study participants. Thirdly, the researcher will ensure that the confidentiality and anonymity of the respondents will be maintained and that personally identifiable information will not be traced back to them.

3.13 CONCLUSION

The chapter presented the research philosophy, Strategy, sampling, and data collection methods. The chapter identifies and defines critical concepts. It provides justifications for selecting specific approaches and techniques. Details regarding the step-by-step process followed during the collection of data and its analysis have been presented in the chapter. Lastly, the chapter offers a comprehensive overview of ethical considerations.

The next section will present and discuss findings from the data analysis.

CHAPTER 4

DATA ANALYSIS AND FINDINGS

4.1 INTRODUCTION

This study aims to develop a conceptual framework that companies can adopt to adequately prepare for adopting big data. The intended use of this framework includes highlighting critical factors that will contribute to the successful implementation of big data. As mentioned in Chapter 3, this chapter offers the analysis and conclusions from the interviews performed with 30 (RAF_PAT1–RAF_PAT30) randomly selected respondents.

4.2 FINDINGS AND ANALYSIS

The data from the interview transcripts were analysed, and emerging themes were identified. At the outset, several emerging patterns in the raw data related to various insights on the suitability of the organization, the development of the organization to be able to implement big data and make an organizational adjustment to cater to its adoption, and the organizational capabilities for optimally working with big data. The numerous patterns in the data were packed into three themes that would essentially aid in the formulation of a framework for successful big data implementation:

i) Technology context
ii) Organization context
iii) Environment context
iv) People context

The researcher will discuss the key findings from the data collected in the next section.

4.2.1 Technology Context

The section looks into the research findings addressing the technology context on businesses' willingness to incorporate big data. The study's findings reveal that technical factors influence both general technology adoption and technological characteristics unique to big data adoption. Individual technology elements influencing big data adoption are covered in this section's research findings. The outcomes of the study suggest patterns in the following areas:

a. Information and Communication Technology (ICT) Infrastructure
b. Data Integration
c. Data Security

4.2.1.1 Information and Communication Technology (ICT) Infrastructure

ICT infrastructure refers to hardware, network, and enterprise systems. Participants pointed out that they do not think the organization's infrastructure is built to handle data volumes quickly. RAF_PAT06 pointed out that although they understand the benefits that come with the adoption of big data, the current ICT infrastructure might not be able to handle of data that the organization might need to be effective in doing their analytics.

RAF_PAT11 denoted that ICT infrastructure should rank amongst the top factors to implement big data successfully.

> "*If we must consider the characteristics of big data, the organization must have a look at the whole infrastructure setup must be looked at. We are struggling as it is with outages; our infrastructure is failing to handle the current volumes of data we have at our disposal. We cannot handle external data coming in different formats."*

When addressing the infrastructure challenges, RAF_PAT21 highlighted that the organization's infrastructure must be suitable.

> "*Our infrastructure requirements must be benchmarked against other public or private organizations that perform the same functions as us. If the ICT infrastructure is not suited for the demands of big data or is not compatible with big data technologies, big data implementation will be much more difficult to carry out successfully".*

RAF_PAT29 mentioned the issue of storage, power, and connectivity as infrastructure capability requirements for big data adoption. The participant highlighted that sometimes systems would be slow due to several factors. The participants introduced the potential of cloud computing service providers in assisting the organization with infrastructure readiness for big data adoption.

> "…*Look, maybe adopting the Infrastructure As A Service (IAAS) model might not be a bad idea if we can successfully meet the storage and processing speed and power required for big data usage. This would also present an opportune moment to formulate our cloud strategy. That way, several overheads, like maintenance, would be out of the way. We can scale up and down to meet as and when more resources are needed."*

The modern technological environment is characterized by processing data transmitted in different formats. Based on the responses from the participants, it can be deduced that the organization's infrastructure was not built to handle big data.

RAF_PAT20 also denoted that the only way for the organization to meet the infrastructure requirement is to adopt the cloud strategy.

> "*We are venturing into unknown territories, I have heard of any state-owned enterprise (SOE) that has adopted big data, and I think it would be best to onboard a cloud computing service provider. Organizations are still struggling with interpreting the Protection of Personal Information Act (POPIA). Our cloud strategy must address the objective of what we are trying to accomplish, highlight the potential gains of going the cloud route, and address the concerns that must be raised before the strategy is adopted. Perhaps if the government could standardize the cloud strategy for all government entities, half of the*

battle would have been won because we would have standardized the technology standards…."

RAF_PAT12 emphasized the need for a cloud adoption paradigm shift.

"I truly believe we missed many opportunities by not adopting the cloud strategy sooner. Most of our data is still on-premises, and there is a big paradigm shift in data and information sharing. For instance, we exchange data with the South African Revenue Services (SARS) to check the IRP5's compliance with our claimants before settling claims and verify with the Compensation Fund for duplicate claims, but that process is still manual. I believe that with cloud computing, data exchange would have been real-time instead of waiting for email responses from concerned parties. By now, data exchange frameworks and models would have been in place, and we would have been scaling up on which data to exchange instead of starting from scratch and initiating the processes. Another case is that of the Department of Home Affairs; we are still not verifying the details of our claimants using the department's databases, just like the banks are doing; to an extent, we are still not sure if we are paying the people we are supposed to pay because the details of the claims are what the claimants are telling us if have to put it that way, this explains the high level of fraudulent claims we had over the years."

4.2.1.2 Data Integration

Data integration refers to aggregating and analyzing data from various sources. Participants highlighted the challenge of gathering data from multiple sources to generate unseen valuunrecognized_PAT3 and noted that data integration stands at the heart of big data analytics.

"… *Let us say we have identified the entities we should be exchanging data with. For example, the Road Traffic Management Corporation (RTMC) is one of our biggest stakeholders; they have the expertise to re-enact a road accident, Hospitals for medical reports, South African Police Services for*

Accident reports, and any other stakeholders, the information they can share with us will reduce much red tape in our claims processing processes.

The settlement turnaround times will improve drastically; we can reduce fraudulent claims drastically. The issue is that all these entities have a way of storing this data. The storage mechanisms are different; some data might be structured, and some might be unstructured, aggregating it into a single entity, which cannot be easy. In a nutshell, the fund can know about the claim before the claimant even comes to formally lodge their claim."

When asked about how the organization is exchanging data and information with other entities, RAF_PAT25 and RAF_PAT9 responded as follows:

"*Even though we have our primary stakeholders here at RAF, the level of integration has not matured to the desired level. As a senior claims administrator, I should be able to query SAPS for an accident report. However, an investigator will have to drive directly to the attending police station to verify the authenticity of the accident report. It is administratively costly to perform such action for each claimant. Now imagine a claims investigator having to drive from East London to Lusikisiki for 6 hours one way to verify the authenticity of a road accident. Some stakeholders still send data in either text or spreadsheet format, and the authenticity and validity of such data come into question during decision making."*

"… Data integration plays a very big role in our daily function; some banks use biometric verification because they have integration with the Department of Home Affairs; it is not like the whole population register is duplicated to the banks; they integrate only at identity verification level, they do not see any other information other than the desired record."

RAF_PAT17 opined the following:

"*As it stands now, we have too much data that we do not know what to do with it. Some business owners are even thinking of either archiving or, worse,e deleting it because they believe too much data in their data stores slows the*

performance of their applications. The scalability issue becomes critical since we cannot anticipate how much data will be streaming. In nature, big data projects volumes of data from various sources coming into a single platform. As a result, the company must be able to meet the processing requirement that comes up with big data implementation."

When asked about any other technological challenges the participants envisage when adopting big data, RAF_PAT3 highlighted the issue of On-premises vs. cloud vs. hybrid as a data integration complexity.

"Our data for core applications are still residing on-premises, as well as our legacy applications that cannot be hosted on the cloud. Now that changes the whole spectrum as far as data integration points are concerned..."

4.2.1.3 Data Security

Before embarking on big data projects, the organization should be able to comply with data security legislation. Due to data sensitivity, adequate security measures and controls are required to ensure that no unauthorized access to harvested data occurs, whether by internal or external people.

RAF_PAT26 stated the following:

"As you know, there are regulations on how personal can be shared; security is one area where we should not be caught napping. We will be receiving data from different sources; data security policies must be in place to ensure that unauthorized cannot access it. Information leaking can bring about undesired consequences to the organization. Data validity would come into question if data were accessed unlawfully."

RAF_PAT29 opined the following about the consequences of data breaches:

"*If it can be established that there have been information leakages on our side, there will be a breakdown in trust between the organization and its stakeholders; worse, stakeholders might withhold their data until security can*

be ascertained. The data security aspect becomes very critical when exchanging data."

4.2.1.4 Organisation Context

The research findings show that there are some considerations at the organizational level. Most participants highlighted management support, financial support, and clarity of objectives as critical if the organization is to realize its big data objectives. This section will highlight the common responses of participants across the three themes generated.

4.2.1.5 Management support

Big projects like big data adoption and implementation require an internal organizational change. Research participants highlighted the importance of having management buy-in in successfully implementing big data. The research findings show that without the involvement of top management support, big data adoption and implementation will not be successful.

RAF_PAT10 mentioned the following regarding changes in the organisation.

"…previously we had serious issues with ICT projects that were flagged as wasteful expenditure because of internal conflict within the organization, peers did not agree on the project deliverables, and as a result, a 57 million rands project was canned because of disagreements between business units. It is not like the project objective were unclear; I think some people within the organization were resistant to change; it was the role of top management to guide change in the organization. Remember that some staff members have been here for the longest time, and changing how they are used to their daily tasks might be met with a high level of resistance. They feel like changing their way of working is an attempt for the organization to remove them from the value change, ultimately retrenchment."

RAF_PAT10 highlighted the following regarding the involvement of top management from the project initiation phase.

> *"Top management must be involved from the initiation phase of the project. Top management can quickly eradicate bureaucracy that might hinder or deter the progress of such projects. Big data adoption and implementation project require strategic change, changing how people do things, so resistance to change is inevitable. We will tell staff members that we rely on data analytics for decision-making. Some might view this as a direct attack on their jobs. Top management must be a driving factor in solidifying that change."*

4.2.1.6 Financial support

Research findings reveal that financial support is needed for big data adoption and implementation to become a reality. ICT projects are costly; any organization undertaking a big data project, whether implementation or adoption, must be willing to allocate more funds.

Regarding the cost factor of big data projects, RAF_PAT3 and RAF_PAT27 denoted the following, respectively:

> *" …. Another factor that we should not overlook is the issue of cost. Big data is a relatively new phenomenon, especially in the public sector; the issue of the availability of funds can result in delays or total failure of the project. During project scoping, it must also be highlighted that the cost might escalate due to unforeseeable factors, like getting additional data scientists' services to help set the analytics baselines and getting additional processing power due to the volumes and variety of data coming into the organization. To successfully adopt big data analytics, the organization might have to spend money they have not initially budgeted for."*

> "*Running costs may be the organization's largest overhead, and service subscription costs will be variable. Training costs will also rise as employees must be trained on new data collection and decision-making mechanisms."*

4.2.1.7 Clarity of objectives

The worth of every project to the organisation determines its overall success. When a project is undertaken without a clear knowledge of how it fits into the organizational goal and purpose, and how the final product supports the organization in accomplishing its strategic objectives, the odds of success are lowered Barhan (2000). The research findings reveal pitfalls that organizations must guard against when coming to the clarity of objectives.

RAF_PAT25 mentioned the following regarding project failures due to unclear objectives.

> *"Previously, we had projects that had to be canned because people that were supposed to be beneficiaries of those projects could not derive value from such projects. For example, the organization spent R57m on a claims system that was supposed to make claim processing smooth, but users found that the old system was much more efficient than what is perceived to be modern solutions; the system was an off shelve solution, and it did not conform to our claim policies, some functionalities did not make sense to the user community. The common voice was that they were not sure how is the new solution making their lives better"* (RAF_PAT25)

4.2.2 Environment context

The last perspective that the research findings reveal is the environment. Participants talked about public acceptance, external attitudes, and external vendor support. This section will discuss research findings in the environmental context of big data adoption.

4.2.2.1 Public acceptance

The public will always scrutinize any project undertaken by the public sector. RAF_PAT28 gave the following account when highlighting the issue of public acceptance that would come with big data adoption.

"…now comes the issue of public acceptance; it can be advocacy groups or the public. The organization is struggling with the backlog in claims settlement; it will be public knowledge that the fund is deploying a solution that costs an x amount of money when they are struggling to settle claims timeously. On the other hand, attorneys might even go the legal route to derail the whole project" (RAF_PAT28).

When asked about how the organization can ensure that the public accepts the big data adoption is taken RAF_PAT25 suggested the following:

"As long as the objectives are unclear on what the organization and claimants would benefit from deploying such a solution, the solution would not be widely accepted. The organization must use the problems they are currently facing, problems like fraudulent claims and backlog in claim settlement, to build a case for why a project like big adoption is needed. That would clarify the objectives of the whole project" (RAF_PAT25)

4.2.2.2 External attitude

Research findings show that external attitude is critical to successfully implementing and adopting big data. Without cooperation between entities supposed to share data, vendors, and service providers, the prospects of a successful big data implementation are limited. This is the view of RAF_PAT5 on the eternal attitude of entities sharing data.

*"…Again, successful big data implementation will be difficult without cooperation among our stakeholders, that is, the entities with whom we will be sharing and exchanging data, and the higher powers in government. Before implementing such a solution, we must ensure that we can manage our stakeholders' expectations, which can be a process, policy, or technical expectations." (*RAF_PAT5)

External attitude can also be viewed in light of competitive pressure where an organization would want to implement a solution because they saw other organizations, whether in the private or public sector, reaping the rewards from adopting the same solution. RAF_PAT5 mentioned the following regarding competitive pressure.

> *"Our claims process, including policies that govern it, is very complex because the organization must conform to the Road Accident Fund Act, 1996 (Act No. 56 of 1996) to compensate road accident victims. We must guard against a 'one glove fits all approach where people think that just because it worked for company X, it will also work for the fund"* (RAF_PAT5)

The other element of external attitude arises from the I.T. trends that organizations are exposed to. RAF_PAT4 noted the following:

> *"We need to appreciate the complexity that comes with big data adoption. People know big data and its potential to help the organization reach its strategic objectives, but they do. However, they stand the complexity of implementing big data and getting accurate decision-making analytics."*

4.2.2.3 External vendor support

The research findings reveal the importance of vendor support to aid the organization in adopting technological advancement. RAF_PAT10 said the following on external vendor support:

> *"Given the complexity is such implementations, our preferred vendors must be willing to walk the journey with us, from the preliminary phases of the project all to the way to the execution phase. Our preferred vendor must sit with us, understand what our requirements are, understand our processes and provide advice so that we do not miss critical deliverables in our project"* (RAF_PAT10)

The participants also emphasized the importance of selecting the right vendor for the project. RAF_PAT21 opined the following regarding vendor selection.

> *"Appointing the right vendor for a project of this magnitude is critical; the preferred vendor must know about big data deployments, and their track record*

must be extraordinarily good. The preferred vendor must also act as a change pioneer because they must drive adoption together with top management." (RAF_PAT21)

4.2.3 People Context

This point of view is concerned with the human elements that drive big data adoption. Respondents are aware of the notion of big data. The research findings reveal that they see the potential of Big Data in assisting the organization to compensate road accident victims effectively. RAF_PAT5 in his account of how big data can improve his job activities.

"*Remember, the fund operates like an insurance company, and defrauding them will be difficult because their decision-making process is data-driven. We can utilise data to judge the merits of the claim instead of depending on what the claimants' representatives tell us because we are still employing a fault-based claim model."*

RAF_PAT7 further pointed out that it is important to have skilled employees to implement big data and benefit from it successfully.

"*The employees' skills are equally important for the success of such an undertaking. They must know which data to push or pull because of the nature of the data we are processing. If incorrect data is presented, we will have incorrect results."*

When asked about the adequacy of skills in the organization, RAF_PAT18 believes that without Data Scientists, the organization will sit with a solution with so much potential. However, it would be inoperative if we did not have Data scientists to define the process.

"…Data Scientists are either in short supply or are costly to acquire. They are responsible for determining which data to capture and the frequency and developing the algorithms for predictive analysis to maximize the data value. As someone in ICT, I can tell you they do not come cheap."

RAF_PAT22 believes that in order to use and understand the insights provided by big data platforms, management should have a minimal level of diagnostic abilities.

> *“Everyone in the organisation, managers included, must possess a basic level of data interrogation skills for big data solutions to be effective. Investing in a decision-supporting tool would be pointless if decision-makers lacked the necessary skills. We understand that some managers do not have a technical background, but they must be trained to use the solution properly. If the managers find it challenging, the solution will be alienated, and they will not use it to support their decision-making process. As a result, the solution will be useless."*

RAF_PAT25 denoted that getting good engineers for big projects like big data implementation does not have to follow the traditional methods of onboarding service providers. The participants noted that independent service providers are very agile, and results are visible in a short space of time.

> "…*it is not always the case that big and reputable service providers will always be successful when on-boarded for big projects. As an organization, we must always keep an open mind when a big project is implemented. We had reputable service providers fail dismally in understanding our requirements. The point I am making is that some of the best talents in data science are not working for big corporates. Reputable service providers are costly; we must guard against the pitfall of paying for a service that we will not utilize. We need service providers that will walk the customer journey with us” RAF*_PAT25

Chwelos et al. (2001) argue that big data adoption requires high information technology expertise. The authors noted that technical capabilities alone would not be enough to successfully implement big data; human resources within the organization must possess specialized knowledge and expertise. It is critical to have personnel with the necessary information technology skills and capabilities to do big data analytics (Chen et al., 2015). People's context was critical for big data adoption and implementation success or failure.

4.3 CONCLUSION

This section summarizes the findings of the preceding analysis. The findings influence the Road Accident Fund's readiness for big data adoption from the People, Technological, Organizational, and Environmental perspectives (RAF). The findings presented in Table 3 are discussed in the following sections. The conclusions were reached through subjective reasoning from an interpretivist perspective. "The interpretivists believe that human experience of the world is subjective and seek to understand it as it is." Kankam (2019). The factors are briefly described in Table 3

Table 4.1: Factors that influence the readiness for the adoption of big data

Findings	**Description**
People Context	
Data Scientists	Data scientists are critical for determining and defining the data needed to be captured. They develop a predictive algorithm to maximize the value of data, helping the organization meet its strategic goals, like zeroing in on fraudulent claims and quick claims settlement.
Managers’ technical abilities	The company's managers' technical skills and capacity to properly employ information mining for making educated choices
ICT engineers' technical skills	ICT Engineers' skills, ability to support critical ICT infrastructure and proficiency in data analytics software operations.
Technology Context	
Information and Communication Technology (ICT) Infrastructure	The ability of ICT infrastructure to manage and analyse data with big data properties such as volume, diversity, velocity, and veracity.

Data Integration	Capability to work with multiple stakeholders to collect, reconcile, and analyze data for informed decisions.
Data Security	Ability to satisfy all security-related concerns from a legislative point of view to individual stakeholders.
Organization Context	
Management Support	Projects that require organizational changes need leadership and support from top management.
Financial Support	Big data projects are costly. This construct discusses the organization's ability to provide financial support for implementing and adopting big data.
Clarity of Objective	Ability to align the project objectives to the organization's mission and vision.
Environment Context	
Public Acceptance	The researcher is assessing the company's likelihood to affect public perception of the initiative positively.
External Attitude	assessing the entity's capacity to attract and retain essential stakeholders' relationships
External Vendor Support	The researcher is evaluating the organization's ability to appoint and form lasting relationships with the right vendors and suppliers.

4.4 DISCUSSION OF FINDINGS

This study examines the critical factors influencing big data readiness at the Road Accident Fund. The researcher introduced the Proposed Big Data Readiness Framework adapted from Technology-Organisation-Environment (TOE) (Tornatzky & Fleischer,1990) (Figure 7). The researcher will present the final model at the end of this chapter (Figure 8). TOE framework categorizes the identified factors into technology, organization, and environment (Bremser et al., 2017). Over the years, TOE has been widely used to investigate organizational and technological innovations; for example, Chiu et al. (2017) used it for Radio Frequency Identification (RFID) and Blockchain technologies (Clohessy & Acton, 2019).

4.4.1 Technology context

The technology aspect of big data readiness is deemed important in this study. The two prominent themes in the study put ICT infrastructure readiness and data integration as the biggest readiness factors for the successful adoption of big data. The organization must commission infrastructure that will be capable of handling big data, given the unique characteristics it possesses. Huge volumes of data will be streaming from multiple sources in different formats. Issues of processing speed and storage capabilities become critical before implementing big data solutions. This was in line with the study of Chen et al. (2015).

Data integration complexities are the heart of big data readiness and adoption. Data integration, according to Arputhamary and Arockiam (2015), is the capacity to read data from several data sources in one format, typically structured data. Because data is streaming in a variety of structured, semi-structured, and unstructured formats, big data adds a new dimension to data integration. Integrating data with characteristics of big data is for traditional warehouses. The organization must develop a new framework for integrating data before adopting big data.

Previous studies have highlighted data security issues in big data (Saraladevi et al., 2015; Sharif et al., 2015). Sensitive and personal information will be shared amongst entities, and the higher the level of information sharing, there more organizations get caught up in data breaches and leakages. To properly use big data, security risks must be addressed prior to implementation. Stakeholders and other entities might withhold their data set if security and privacy concerns are not properly and adequately addressed. According to Lee (2017), user resistance to big data adoption is caused by a poor or negative security posture. Concerns about data security and privacy have been identified as technological barriers to big data adoption (Salleh & Janczewski, 2019).

The technology perspective, comprising ICT infrastructure, data integration, and data security, was critical for successfully adopting big data.

4.4.2 Organization context

From the organization context, many studies (Barham & Daim, 2020; Hsu et al., 2019; Motau & Kalema, 2016) on big data readiness and adoption highlighted management support as critical to adopting big data. Like big data, projects that require organizational change require top management to lead this change. Change in an organization might be met by internal resistance; it is the top management's responsibility to remove barriers and obstacles for change to happen in an organization. Top management support influences the successful deployment of big data in the organization.

Chau & Hui (2001) identified lack of funding as a serious impediment to Information Technology projects. The cost relates to installation costs, training of internal resources, onboarding of service providers and infrastructure-related costs, and ongoing usage costs. Iacovou et al. (1995) added financial readiness as an important factor for organizations deploying data exchange-related projects. Big data projects are costly due to their unique nature since their implementation does not follow a one-size-fits-all principle. Most studies did not include this factor in their studies.

(Barham & Daim (2020) did not have financial support in their research because they assumed that the financial resources were available for big data adoption. Financial supports place a critical role in the adoption of big data.

When a large-scale project is undertaken without a clear understanding of how it relates to an organizational mission, it is doomed to fail. The results determine the success of a project it produces at the corporate level. The organization must avoid the trap of jumping on the big data bandwagon in order to demonstrate its technological savvy. With the assistance of big data subject matter experts, the organisation has to choose the appropriate questions to ask about its difficulties. In this case, RAF can address the issues of financial liabilities resulting from fraud and quick turnaround times in claims settlement.

4.4.3 Environmental context

RAF is a public entity that generates income from the fuel levy. The public would want a say on how funds are spent in the organization. The organisation must present the impending endeavour as a worthwhile endeavour. If the organisation fails to persuade the public why it is implementing big data technologies, the public will perceive it as a waste of financial resources that could have been better spent compensating road accident victims. Public acceptance is also critical to successfully deploying big data in the organization.

Road Accident Fund needs to ensure that stakeholders and entities they share data with are engaged in the implementation process. Here, the organization is committed to external stakeholders and manages their expectations.

The organization must appoint vendors and service providers with proven experience in big data adoption. The preferred service providers must walk this journey with the organization. Baig et al. (2019) and Villars et al. (2011) highlighted the importance of onboarding vendors that offer technical support post-implementation.

This study deployed the TOE framework to identify factors critical for adopting big data deployment according to the three scopes: technology, organization, and environment. The people's perspective was also discussed in the section above.

4.4.4 People Context

The people context (Barham & Daim, 2020) was added to the model; this is to emphasise that not only are people inside the organisation vital for big data adoption, but people outside the organisation also play a vital role in effectively implementing big data. The role of data scientists is to "identify patterns, apply context and intelligence, extract relevant information hidden in the large volumes of data…" (De Mauro et al., 2016). According to Barham and Daim (2020), Data scientists are the thinkers who can determine what kind, dimensions, and rate at which data must be collected. Data scientists are said to be in short supply around the world. A lack of data scientists is becoming a major barrier in certain sectors of the economy (Davenport and Patil 2012),

According to de Mauro et al. (2016), engineers in ICT for big data focus on building and maintaining the entire technology infrastructure that enables the storage and processing of big data. Engineers oversee the enterprise server platform and ensure that the Extract-Transform-Load (ETL) disaster recovery processes are in place, as well as deploying solutions and scaling backend data storage platforms.

According to McAfee & Brynjolfsson (2012), data-driven decisions are better, and big data enables managers to decide based on evidence rather than intuition. That makes it important for management to develop technical analytics skills to take advantage of big data's benefits fully. Managers who possess less analytical would have little interest in using big data analytical capabilities. As a result, they will be discouraged from using it, rendering the whole project useless (Carillo, 2017).

The conclusion that people's perspectives, data scientists' technical abilities, ICT engineers' technical skills, and management's analytical skills all play a vital part in the Road Accident Fund's big data preparation is supported by empirical evidence from the literature.

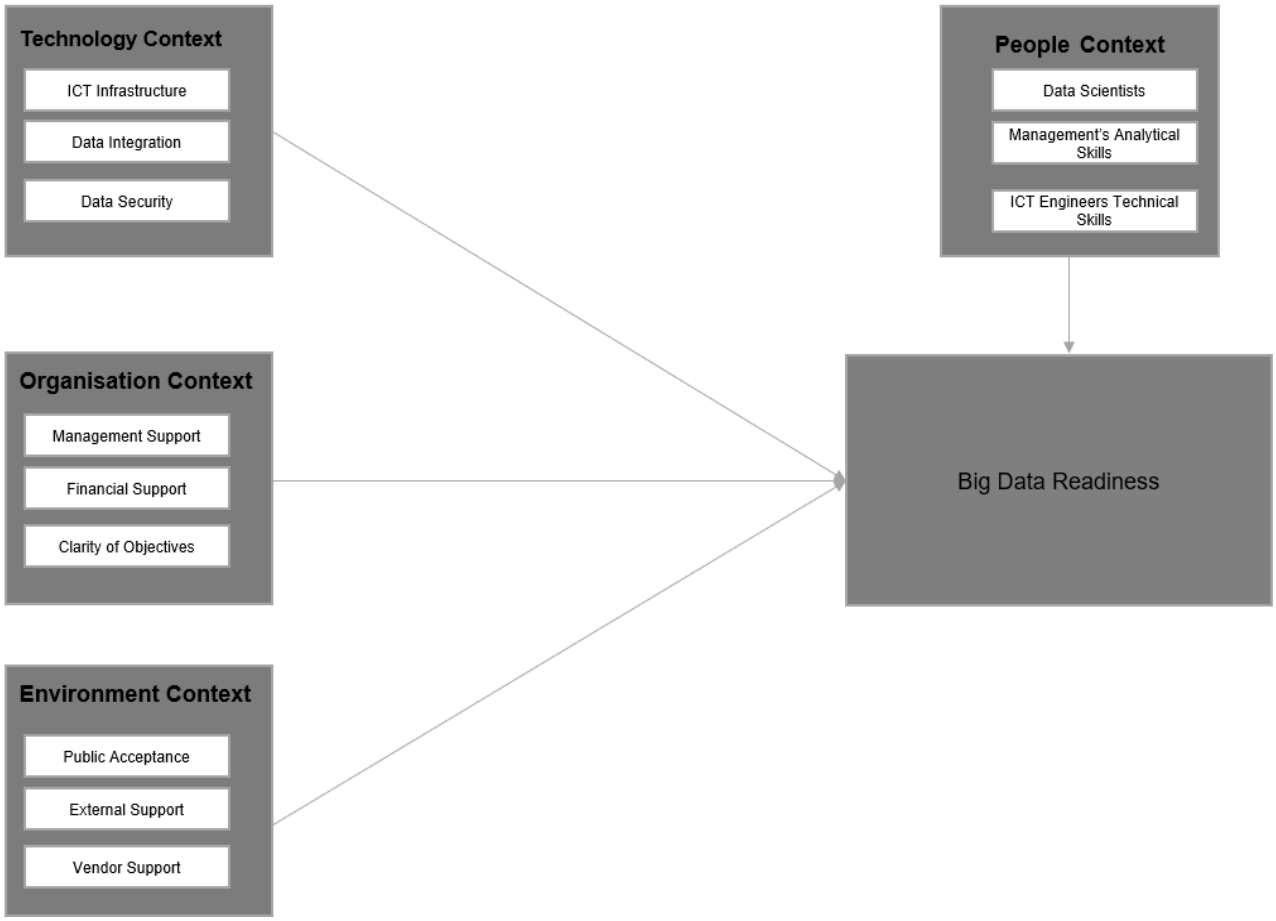


Figure 4.1: The final TOE framework for Big Data Readiness

4.5 CONCLUSION

In this chapter, the researcher presented the research's analysis and findings. The final big data readiness was reported. The TOE framework was used to categorize factors using three dimensions of the TOE framework, that is technology, organization, and environment. The people perspective was added to the final big data readiness framework. The literature largely supports the research findings, as discussed in Chapters 2 and 4. In the next chapter, the researcher discusses the recommendation.

CHAPTER5

CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

This chapter presents the research study's conclusion and recommendations. The purpose of this research was to analyse and evaluate the variables important to the successful deployment of big data at the Road Accident Fund and as well as to create a preparedness framework that identifies common factors that greatly influence the efficacy or otherwise of the big data project. The chapter offers a restatement of the research's goal, a summary of findings, and managerial advice. The chapter concludes by highlighting the study's limitations.

5.2 REASSERTION OF THE PURPOSE OF THE STUDY

The study aims to investigate and assess the factors critical for implementing big data at the Road Accident Fund. The study's goal is to create a big data preparedness framework that will serve as a reference for future big data projects.

The research study was driven by the question below:

What are environmental, technological, and organizational readiness factors relating to big data?

A Big Data Readiness Framework was developed due to the analysis in Chapter 4 and is depicted in Figure 8 in Chapter 4. According to the researcher, the research mentioned above question has been comprehensively answered, and thus the study's purpose has been met. The proposed readiness framework can be used as a guideline for big data adoption and implementation in the public sector.

Research findings reveal the people's perspective as critical readiness for big data adoption. The availability of data scientists, analytical skills of management, and the ICT skills of engineers was found to be critical for the readiness factor.

Management and financial support were also critical were also found to be critical factors for the readiness of big data; only participants in management raised the clarity of objectives factor. External attitude is featured very highly from the environmental perspective. The clarity of objectives factor influences this factor in the organisational perspective. The study's findings reveal that stakeholders are bound to develop a positive attitude toward the project if their objectives are clear. Big data analytics is a relatively niche market; some firms might not be well-equipped to handle such projects. Organisations need to onboard reputable service providers.

5.3 FUTURE RESEARCH

This study is looking at a single state-owned entity, future studies should look at designing a big data readiness and adoption framework that cuts across all state-owned companies. A generic big data readiness and adoption framework that seeks to set a minimum standard which state-owned entities needs to follow to prepare and implement big data initiatives. The model needs to be occasionally redeveloped through additional research to keep is relevant.

Future research can be undertaken to assess critical success factors for big data that are dynamic in nature are bound to change based on nature of service and good the state-owned company is offering. Based on the people perspective that emerged from the research findings, future research can be undertaken to understand the holistic people perspective in big data readiness and adoption

CHAPTER 6

SUMMARY OF THE FINDINGS

6.1 SUMMARY OF FINDINGS

The initial aim of this study was to investigate and assess the factors critical for the successful implementation of big data at the Road Accident Fund. The Technology Organisation Environment (TOE) was utilized to find elements essential for successfully adopting big data. The research findings revealed that the technology factors driving big data adoption are ICT infrastructure readiness, Data integration, and data security. The organizational factors that positively influence the adoption of big data are management support, financial support, clarity of objectives in the environmental context of big data adoption, public acceptance, external attitude, and vendor support. The people perspective was added to the final model, as revealed by the research findings.

6.2 MANAGEMENT'S RECOMMENDATIONS

The recommendations are summarised and described below based on the findings discussed in Chapter 5.

6.2.1 Adopt a data-driven culture.

The organisation should embrace and implement a culture of data-driven behaviour in which data is valued and all decisions are based on data-driven insights. This can be achieved by educating employees about the importance of data and involving them in data-driven projects. Adopting an atmosphere that values data is critical for organisations seeking big data readiness. A culture that relies on data is one in which recommendations are made on the basis of data and insights rather than intuition or personal preferences. It requires a shift in mindset and a commitment to using data to inform and guide decision-making at all levels of the organization.

In addition to technology, having the right skills and expertise is important. This includes data scientists, engineers, and business analysts who can help extract insights from the data and communicate them meaningfully. Organizations should also invest in training and development programs to build employee data literacy and data-driven thinking.

Finally, it is important to create a supportive culture that values and encourages the use of data in decision-making. This includes encouraging open and honest communication, promoting a culture of experimentation, and empowering employees to make data-driven decisions. Organizations should also establish clear data governance policies and protocols to ensure data is used ethically and responsibly.

adopting a data-driven culture is critical for organizations looking to be big data-ready. By using data to inform decision-making, organizations can improve outcomes, increase transparency and accountability, and gain a competitive advantage in the market. Investing in technology, skills, and culture is essential to making this shift and building a data-driven organization.

6.2.2 Establish a data governance framework

A strong data governance framework is crucial to ensure data security, privacy, and compliance and maximize data value. The RAF must establish data governance policies and processes and appoint a data governance team to oversee implementation and enforcement.

6.2.3 Define a data architecture

The organization must design a scalable and flexible data architecture that can accommodate the increasing volumes, velocity, and variety of data. Data architecture plays a crucial role in big data readiness. It is the basis upon which big data solutions are constructed, and organisations must have a well-designed data architecture in order to fully exploit the power of big data.

Understanding the type and source of data that will be used is the first stage in developing a big data architecture.

This includes structured and unstructured data, such as log files, social media posts, and sensor data. The architecture must also accommodate various data formats and protocols and handle the volume and velocity of incoming data. Once the data sources have been identified, the next step is to design a data storage and processing infrastructure. This involves choosing the right technologies, such as Hadoop, Spark, or NoSQL databases, and determining how data will be stored, processed, and analyzed. The architecture must also include data governance and management mechanisms, such as data security, quality, and retention policies.

Another important aspect of data architecture for big data is data integration. This involves combining data from different sources into a coherent view that can be analyzed and used for decision-making. This can be achieved through data warehousing, virtualization, or lakes. The goal is to create a single source of truth for the organization, which can be used to drive business insights and decision-making. it is important to consider the scalability of the data architecture. As big data continues to grow, the architecture must be able to accommodate increasing volumes of data and provide the necessary computing resources to process it. This requires a flexible, scalable, and modular architecture that can be adapted as the needs of the organization change.

6.2.4 Cloud Computing

Cloud computing has become an increasingly important factor in big data readiness. Cloud computing offers a solution to this problem by providing scalable, flexible, and cost-effective resources that can be used to store and process big data.

One of the main benefits of cloud computing is the ability to store and access large amounts of data. With cloud storage, businesses can store massive amounts of data without worrying about running out of space on their servers. This is especially important for big data, as the sheer volume of data can be too much for traditional storage solutions.

Another significant advantage of cloud computing is the ability to handle massive amounts of data. Cloud computing provides access to sophisticated resources that can process large amounts of data rapidly and efficiently. This is essential for big data, as the data must be processed in real-time to provide actionable insights. Cloud computing also offers flexible and scalable computing infrastructure, meaning businesses can add or remove computing resources as needed to meet changing demands.

Cloud computing further offers economic benefits for big data readiness. By using cloud resources, businesses can save money purchasing and maintaining their hardware and software. They can also avoid the costs of hiring additional I.T. staff to manage the infrastructure. Furthermore, cloud computing providers often offer subscription-based pricing models, allowing businesses to pay only for the needed resources. This helps to minimize costs and provides a more flexible and scalable solution. Cloud computing addresses the issues posed by big data through its ability to store and process enormous amounts of data. It provides a versatile, scalable, and cost-effective infrastructure for big data initiatives. Cloud computing will likely become even more important for firms wanting to stay ahead of the curve as big data grows.

6.2.5 Continuous evaluation and adoption

Continuous evaluation and adoption are important aspects of big data readiness. Organizations must proactively approach big data to remain competitive and relevant in an ever-evolving technology landscape. Continuous evaluation and adoption ensure that organizations are up to date with the latest technologies and best practices and can quickly adapt to new developments in the big data space.

One of the key benefits of continuous evaluation and adoption is staying ahead of the curve. By continuously evaluating and adopting new technologies and best practices, organizations can stay ahead of their competition and take advantage of new opportunities. This allows them to remain relevant and competitive in a rapidly changing technology landscape.

Another key benefit is increased efficiency. By continuously evaluating and adopting new technologies, organizations can improve the efficiency of their big data initiatives, reducing costs and increasing productivity. This can result in improved business outcomes and a competitive advantage in the market.

Organizations must clearly understand their big data goals and objectives to implement continuous evaluation and adoption. This includes understanding the types of data they need to collect and analyze and the specific outcomes they hope to achieve. Organizations should also have a clear strategy in place for how they will evaluate and adopt new technologies and best practices.

In addition to having a clear strategy, organizations must have the right skills and expertise. This includes data scientists, engineers, and business analysts who can help evaluate and adopt new technologies. Organizations should also invest in training and development programs to build all employees' necessary skills and expertise. Organizations should also establish clear governance policies and protocols to evaluate and adopt new technologies responsibly and ethically.

Organisations may effectively harness the full potential of big data and achieve their goals by staying ahead of the curve, increasing efficiency, and having the proper skills and culture. By committing to continual evaluation and implementation, organisations may position themselves for success in the big data age.

6.3 LIMITATIONS OF THE STUDY

The study aimed to develop a big data readiness framework for the public sector; it would become very difficult to extrapolate the results to other public entities due to various factors, including but not limited to the organization's size and the operating model.

6.4 CONCLUSION

This research study assessed the critical factors for adopting big data at the Road Accident Fund. According to the research findings, technological, organisational, and environmental factors all positively influence big data adoption. A researcher created a

framework for big data readiness. The people perspective was added to the final framework to highlight the human influence of big data adoption. Management also made recommendations to prepare themselves for big data adoption further. Organizations evolve, so future research on big data readiness must be aimed at refining the big data readiness framework.

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APPENDIXES

APPENDIX A: CLEARANCE APPROVAL

Graduate School of Business Administration
University of the Witwatersrand, Johannesburg

Wits Business School Ethics Committee
Constituted under the University Human Research Ethics Committee (Non-Medical)

Ethics Clearance Certificate

Ethics protocol number: WBS/BA1792623/938
This certificate is only valid with a legitimate ethics protocol number and signed by the Researcher (below).

This certificate is only valid if accompanied by formal permission from the relevant stakeholder(s).

Project title	The Road Accident Fund's readiness to adopt big data
Investigator / Researcher	Mr Moloko Moneatse
Nature of Project	MBA (Research Article)
Decision of the Committee	Approved, provided stakeholders and participants are guaranteed confidentialty.
Issue Date of Certificate	2022-11-28
Expiry date	Date of submission of the project / research report
Chairperson	Prof Anthony Stacey ☎ +27 11 717 3587 +27 82 880 4531 anthony.stacey@wits.ac.za

Declaration by Researcher

One copy must be signed by the Researcher and returned to the Chairperson of the Wits Business School Ethics Committee.

I fully understand the conditions under which I am authorized to carry out the abovementioned research and I guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I undertake to resubmit the protocol to the Committee.

mcmoneatse
Signature

13/12/2022
Date:

APPENDIX B: APPROVAL TO CONDUCT RESEARCH PROJECT AT THE ORGANISATION

Memorandum

Road Accident Fund

TO: IAN BARRIEL
ACTING CHIEF CORPORATE SUPPORT OFFICER

FROM: MICKEY ARONSON
ACTING SENIOR MANAGER: LEARNING & DEVELOPMENT

SUBJECT: RESEARCH APPLICATION: MOLOKO MONEATSE

TYPE OF MEMORANDUM:			
Information Memorandum		Decision Memorandum	✓
(Tick ✓ the applicable block. If you have selected the 'Decision Memorandum' also tick ✓ the applicable option of relevance to your submission)		1. Strategy Endorsement	
		2. Commercial Options	
		3. Approval	✓

1. Purpose

1.1 The purpose of this Memorandum is to seek approval from the Acting Chief Corporate Support Officer (ACCSO), to grant Moloko Moneatse, permission to conduct a research and data collection exercise from the Road Accident Fund (RAF). A copy of the research application form is attached hereto.

2. Background

2.1 Moloko Moneatse is an internal applicant and is a registered student at the Wits Business School for a Master of Business Administration. The topic for his research is titled, The Road Accident Fund's readiness to adopt Big Data. The data collection method will be through interviews. A list of questions to be used for this research and a letter from the Institution are also attached hereto.

1

SUBJECT: RESEARCH APPLICATION: MONEATSE MOLOKO

3. **Discussion**

3.1 The Research Committee comprises of representatives from the Human Capital Department (Learning and Development) and Legal and Compliance Department (PAIA and POPIA Unit), respectively.

3.2 The purpose of the committee is to assess each research request and check compliance in terms of the RAFs' Policies, Procedures and Rules regarding access to RAF information. Upon application of its due diligence mandate, the committee is further tasked, to make a recommendation to the Executive in terms of either accepting or rejecting the application made.

3.3 The findings of the research will be used solely for academic purposes. No part of it may be circulated, quoted, or reproduced for distribution outside the organisation, without prior approval of RAF CEO.

4. **Consultation**

4.1 PAIA and POPIA Unit.

5. **Legal Implications**

5.1 None.

6. **Communication Implications**

6.1 None.

7. **Financial Implications**

7.1 None.

8. **Attachments**

8.1 Research Application

8.2 List of questions for research

8.3 Letter from the Institution

SUBJECT: RESEARCH APPLICATION: MONEATSE MOLOKO

9. Recommendations

9.1 It is recommended that the research application be approved.

10. **Author's** Declaration

I hereby confirm that relevant and applicable RAF Policies, procurement processes, PFMA and its Regulations, including any other regulatory requirements have been complied with.

11. **Signatures:**

Prepared by:

T.Tshikomb
T.Tshikomb (Jan 16, 2023 11:34 GMT+2)

Thato Tshikomb
Skills Development Facilitator
Date:16/01/2023

Supported / Not Supported

MAronson
MAronson (Jan 16, 2023 11:55 GMT+2)

Mickey Aronson
Acting Senior Manager: Learning & Development
Date: Jan 16, 2023
Comments:

SUBJECT: RESEARCH APPLICATION: MONEATSE MOLOKO

Recommendation(s): It is recommended that the research application be approved.

Supported / Not Supported

Boipelo Mothopi

Boipelo Mothopi
Manager: Complaints and PAIA
Date: Jan 16, 2023
Comments: Supported

Supported / Not Supported

M. Morgan
M. Morgan (Jan 16, 2023 12:37 GMT+2)

Michelle Morgan
Senior Manager: Compliance
Date: Jan 16, 2023
Comments:

Approved / Not Approved

Ian Barriel (Jan 16, 2023 13:20 GMT+2)

Ian Barriel
Acting Chief Corporate Support Officer
Date: Jan 16, 2023
Comments: Approved

APPENDIX C: ILLUSTRATION OF A SIGNED CONSENT FORM

Consent Form

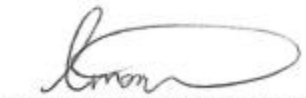
The Road Accident Fund's readiness to adopt Big Data

Mr. Moloko Moneatse

I, Innocent Mondy, agree to participate in this research project. The research has been explained to me, and I understand what my participation will involve. I agree to the following:

(Please circle the appropriate options below).

I agree that my participation will remain anonymous.	YES	NO
I agree that the researcher may use anonymous quotes in their research report.	YES	NO
I agree that the interview may be audio recorded.	YES	NO
I agree that the information I provide may be used in an anonymized format after this project has ended for academic purposes by other researchers, subject to their own ethics clearance being obtained.	YES	NO



..... (signature)

Innocent Mondy ..... (name of participant)

08/01/2023 ..... (date)



..... (signature)

Moloko Moneatse ..... (name of the person seeking consent)

08/01/2023 ..... (date)

APPENDIX D: INTERVIEW QUESTIONS



Interview Questions

The Road Accident Fund's readiness to adopt big data

1. Could you briefly list the primary activities performed by your organization?
2. How do you use digital data and information to perform your job?
3. Is your organization data-oriented or data-intensive?
4. What do you understand about the term big data and the benefits of its adoption in your line of work?
5. Do you think the RAF ICT infrastructure can handle Big Data? Please elaborate
6. In your opinion, do you feel that the organization's security framework models are adequate for big data adoption? Please elaborate
7. Is your organization currently sharing data with other (both private and public) organizations? How is data transferred?
8. What technological challenges do you envisage facing when adopting big data?
9. From a technology perspective, what other factors do you think are critical for big data adoption?

10. How often does the RAF implement big projects?
11. In your opinion, do you think top management offers enough support for big projects? Please elaborate.
12. As an employee of the organization, do you always have clarity on why some projects are implemented?
13. Is the organization willing to sponsor big projects?
14. What organizational challenges do you envisage facing when adopting big data?
15. Are there other organizational factors that might contribute to the successful adoption of big data?

16. In your opinion, do you think RAF will be able to convey the right message to the public as Big Data is adopted? If yes, why? If not, why not?
17. In your opinion, what do you think the external attitude would be?
18. In your opinion, do you think RAF always appoints the right service providers for their projects? If yes, why? If no, why not?
19. What are the environmental challenges do you envisage facing when adopting big data?
    a. Why do you think you will encounter those challenges? Please share with me just two of those challenges.
    b. How can those challenges be overcome?
20. Are there any other environmental factors that might be critical to successfully adopting Big Data?