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Opportunities for implementing Big Data Analytics in a financial services group

Matome Masiela

0505358e

A consultancy report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Business Administration

Johannesburg, 2019

Protocol number: WBS/BA0505358e/352

(Version February 2018)

DECLARATION

I, **Matome Masiela**, declare that this consultancy report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the Graduate School of Business Administration, University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.



Matome Masiela

Signed at 1 **Discovery Place, Sandton**

On the 24th day of March 2019

ACKNOWLEDGEMENTS

First and foremost I would like to express my profound gratitude and appreciation to my family for their kind-cooperation and encouragement, allowing me to enrol for the MBA programme. They gave me their utmost support through the journey to until the end. It was very challenging but they still believed in me. That was motivation enough and kept me going throughout my sleepless nights. This dissertation is dedicated to you all, as I would not have completed it without your blessings, perseverance, support, and fortitude.

To my extended family and friends, thank you for your cooperation and support too. I know, my hectic schoolwork excuses and justifications for not being able to make it to your functions and even funerals, where my attendance was highly expected, were becoming a norm to many of you.

Special thanks to all the people who reviewed my document and giving me insightful comments and guidance.

SUPPLEMENTARY INFORMATION

Supervisor:	Mike Munday
Word count †:	13325
Supplementary files:	Interview transcripts

EXECUTIVE SUMMARY

Even though most organisations are aware of the benefits and advantages offered by Big Data Analytics (BDA), many of them are still far behind when it comes to adopting and implementing the technology. The emergence of big data has received a considerable amount of attention from both academics and businesses, with the literature on the concept correspondingly rising too.

This study focused on the factors that contributed to the XYZ financial services group taking longer to adopt 0and implement BDA despite its apparent advantages over the traditional approach. To investigate the reasons for the delay, the study undertook an interpretive qualitative research approach to understand the fundamentals relating to the delay. The research approach was interpretive social science (ISS), which examines the social reality of why there are delays in adopting BDA. A guideline made of standardised comparable and similar open-ended interview questions was constructed to solicit data from interviewees drawn from different levels of the organisational hierarchy.

The data was collected through interviews and analysed using a thematic analysis technique and presented according to themes extracted from categories. The empirical study has shown that organisational dynamics, which constitute internal and external factors, play a huge role in determining the readiness of the organisation to adopt and implement the technology. Different strategies and approaches were derived from the findings, to assist in advancing the BDA project in the organisation under study. For academics, the study will advance the literature available on big data and BDA from a South African context and Africa as a whole.

Keywords: Big Data, Big Data Analytics, Business Analytics.

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ACRONYMS AND ABBREVIATIONS

AI	Artificial Intelligence
BD	Big Data
BDA	Big Data Analytics
BDAC	Big Data Analytics Capabilities
BI	Business Intelligence
CIO	Chief Information Officer
DOI	Diffusion of Innovation
GDP	Gross Domestic Product
HDFS	Hadoop Distributed File System
ICT	Information and Communications Technology
IoT	Internet of Things
IT	Information Technology
OLC	Organisational Learning Capability
SA	South Africa
SEDA	Small Enterprise Development Agency
TAM	Technology Acceptance Model
TOE	Technology Organization Environment
TRA	Theory of Reasoned Action
TTF	Task Technology Fit

UTAUT Unified Theory of Acceptance and Use of Technology

CHAPTER 1

1 INTRODUCTION

1.1 Background

The recent outburst of big data has led to many organisations implementing Big Data Analytics capabilities to enhance their business performance (Akter, Wamba, Gunasekaran, Gubey, & Childe, 2016), to generate new knowledge to achieve a competitive advantage (Manyika et al., 2011; Russom, 2011), to discover new trends, to improve financial performance and to improve their decision-making process (Manyika et al., 2011; McAfee & Brynjolfsson, 2012). The study conducted by Frizzo-Barker, Chow-White, Mozafari, and Ha (2016) indicates that the number of studies on big data is increasing and the number of big data publications produced annually is growing. In 2014 alone, 107 academic articles were published (Sen, Ozturkb & Vayvayc, 2016). These have prompted many organisations to explore their stored data in an attempt to derive value out of them. It is evident that the phenomenon has led to many companies, governments, healthcare sectors, information technology (IT) and marketing specialists investigating the potential benefits of big data (Gartner, 2016; Manyika et al., 2011; Vela, 2017).

Some studies on big data also pointed out that the concept of BDA works for some organisations but not for all (Akter et al., 2016). Only a few organisations have managed to fully benefit from the concept of big data. Furthermore, big data can pose a threat to an organisation in instances where data privacy is violated, even though a large amount of data can be beneficial to the company (Cumbley & Church, 2013; Sivarajah, Kamal, Irani, & Weerakkody, 2017). It is very costly and time-consuming to implement, but its benefits, such as giving a company a competitive advantage, cannot be overlooked as the benefits can outweigh the resistors to implementing it in the long run (Brown, Chui, & Manyika, 2011). Most

companies are not ready to implement big data as they are still facing challenges with the issues posed by the technology. Others are lacking the skills and resources to implement it.

Many organisations are now placing considerable reliance on big data for their decision-making process as it provides valuable information, which allows them to make instantaneous decisions around business practices and service operations (Bhoola, Kruger, Peick, Pio, & Tshabalala, 2014). Likewise, Bhoola et al. (2014) and Elgendy & Elragal (2016) indicated that insights from big data are quite meaningful as they enable organisations to instantly make effective decisions. There are many benefits and much valuable information that businesses can gain from the information content of large data sets (Commonwealth of Australia, 2013). Business processes can be monitored in real-time and thereby enable organisations to proactively manage events that are likely to impact negatively on the business's operations and performance (Manyika et al., 2011). Being able to analyse customer behaviour and market potential using insights derived from big data introduces a new paradigm shift for most organisations (Buhl, Röglinger, Moser, & Heidemann, 2013; Manyika et al., 2011).

Analysis of structured and unstructured data will help companies to improve their service delivery, to derive new insights, which can better inform their product development strategies, to achieve a competitive advantage, to enhance profitability and to manage costs effectively (Commonwealth of Australia, 2013; Vela, 2017). The study conducted by Gartner (2013), showed that more organisations from various sectors are planning to adopt a big data strategy whereas others are planning to implement it. A survey conducted in 2016, further showed a 3% increase in the number of companies that invested in big data from 45% to 48% since 2015. However, those that are planning to invest showed a decreasing trend from 31% to 25% over the same period (Gartner, 2016). Organisations are now more concerned about how to benefit from the technology as opposed to collecting data and performing analytics without a valid business case for doing so.

The company under consideration is a financial services company in South Africa, with its headquarters in Johannesburg. The company's identity will be concealed to prevent confidential company information from being made public, and henceforth the company will be referred to as XYZ financial services group. This study intended to assess whether BDA can be implemented in this financial services company. Furthermore, the paper will discuss the benefits associated with the technology.

1.2 Problem Statement

Poor performance, low efficiency and low effectiveness have been identified at XYZ financial services group, thereby leading to low productivity and sub-optimal profitability. This is as a result of the company being fixated with the traditional approaches of doing business. Notwithstanding that there are serious conversations in the company about the need, preparedness, advantages and disadvantages regarding the adoption of BDA, to ease the process of doing business as well as to improve efficiency, effectiveness, performance, productivity and profitability. This is despite it having been established that the immense value of big data can no longer be overlooked. To this end, this study focused on the contributing factors that account for the company to have taken so long to adopt and implement BDA despite its apparent advantages over the traditional approach. This is against the background that the company, with a global footprint, is actually reacting rather than be proactive in its processes of doing business. More importantly, it is worth submitting that most big data studies have been conducted in China, Europe and the USA. It follows, however, that it is therefore fitting to research the applicability of the concept from an African perspective but with specific reference to South Africa. This is largely because Africa, including South Africa, has not featured on the list of countries that are contributing positively to the literature of big data (Côrte-Real, Oliveira, & Ruivo, 2017). This apparent intellectual paucity is the one that this research is trying to fill.

1.3 Research Questions and Objectives

1.3.1 Main research questions

1. Why is it taking so long for XYZ financial services group to adopt and implement BDA?

1.3.2 Sub-questions

1. How can BDA improve the financial company's performance, efficiency, effectiveness, productivity and profitability?
2. How can BDA improve the financial company's competitive edge in the industry?
3. How can the company adopt and implement BDA? Which strategy can be employed to implement BDA in the company?
4. What factors can effectively account for the company's delay in adoption and implementation of BDA?
5. What challenges is the company facing in its quest to introduce and implement BDA?
6. What practical measures or strategies can be adopted to address the identified challenges towards the adoption and implementation of BDA in the company?

1.4 Purpose of the Study

The purpose of this study was to examine the factors that could appropriately account for the delay in adopting and implementing BDA in this financial company despite the apparent advantages of BDA in the financial sector. From the literature and readily available pieces of evidence, it has become common knowledge that BDA has fundamentally transformed and eased the way of doing business, notably in the financial sector. Thus, the main intent of this study is premised on investigating the structural and contextual factors that can effectively

explain why XYZ financial services group is taking a long time to adopt and implement this digital methodology of doing business.

1.5 Intended Contribution of the Study

From the literature reviewed it has been identified that no study has ever been conducted to analyse the opportunities, relevance and advantages of adopting and implementing BDA in the financial sector in South Africa, and Africa in general. Studies conducted on the topic of the adoption and implementation of BDA in the financial sector are fundamentally Eurocentric, American and Chinese. Thus very little is known regarding how and why the adoption and implementation of BDA can be of greater advantage in the financial sector from a South African and African standpoint. Therefore, it is important, as this study considers, to lay bare the factors explaining how and why the adoption and implementation of BDA is taking a long time to implement in South African financial companies. Thus, undertaking a study of this nature in a South African context will help to determine the critical success factors that could aptly explain the delays and dithering in adopting and implementing BDA in the financial sector in South Africa primarily and in Africa generally. Cognisant of this academic research is a welcome attempt to address this intellectual gap existing in the literature about BDA in the financial services as well as literature regarding BDA in general. Furthermore, the results of this research are considered to be relevant to various stakeholders of the company but not limited to the following: customers, government, policymakers and academics. However, specific focus is on the company's subsidiaries around the globe as this research is primarily focused on the company's delays in adopting and implementing BDA.

As pointed out in the study conducted by Vela (2017), the real state of big data adoption in South Africa is not yet known. Figure 1 illustrates the adoption rate of BDA by big companies in South Africa since 2012. It is evident that South African companies are adopting the technology, although at a very slow pace.

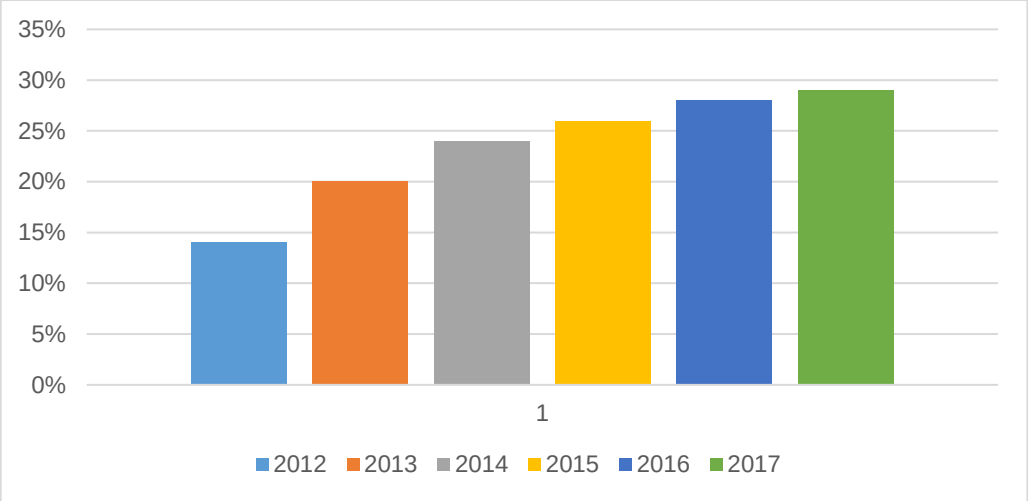

Figure 1: State of big data adoption in South Africa (Bhoola et al., 2014, p.107)

The study conducted by Strategy Worx indicated that South African online companies have made considerable progress in the implementation, practice and usage of BDA to boost their performance compared to banks and other financial service companies (Malaka & Brown, 2015). Adopting BDA will benefit and improve the performance of South African companies. Thus, this shocking state of BDA in the country, particularly in the financial sector, justifies the need to undertake a close and critical academic examination to establish the factors that could aptly explain why the South African financial companies are delaying and dithering in adopting and implementing BDA. Ransbotham & Kiron (2017) also pointed out that BDA can be a source of innovation, allowing companies to be leaders in product development and service delivery.

1.6 Delimitations of the Study

The study was conducted in a large integrated financial service provider in Johannesburg, South Africa, and focused on examining the factors accounting for the delays in adopting and implementing BDA in the company. Thus, issues to do with how the company provides its services to the clients and its organisational culture, among others, are outside the scope of this research.

1.7 Conclusion

The need to carry out the study in XYZ financial services group was established. It is of utmost importance to investigate and determine why the company has dragged its feet and is taking longer to implement BDA even though its obvious advantages of simplifying business processes, enhancing strategies for product development, and improving customer experience, business performance and profitability are known. Research has also shown that South African companies are adopting the technology, albeit at a very slow pace. The scarcity of big data academic research conducted in South Africa has also led to the focus of this study. It seems that by adopting big data, South African companies are likely to benefit from the technology, and this study intends to explore this idea to determine whether this is true or not. The next chapter will present and discuss the literature of the main concepts and theories that inform this study.

CHAPTER 2

2 LITERATURE REVIEW

2.1 Introduction

This chapter present and discuss the literature that informs this study. Therefore, literature regarding the conceptualisation and genesis of both Big Data and BDA were considerably reviewed. Furthermore the following were also reviewed; literature regarding the critical success factors that are necessary for effective adoption and implementation of BDA as well as the motivation of adopting and implementing, and more importantly literature about which between the traditional and BDA approaches should be adopted as well as the status of BDA in South Africa in general. The chapter also presented the theoretical framework of this study.

2.2 Evolution of Data Analytics

Since 1990, companies have utilised reports generated from their analysed and structured historical data to understand their business performance. This phenomenon is called Business intelligence (BI), which is synonymous with today's analytics (Philpott, 2010). Eckerson (2008) defines analytics as "a subset of business intelligence (BI), which is a set of processes and tools that enable business users to turn information into knowledge to assist with decisions, enhance planning, and optimize performance" (p.2). The right approach and implementation of BI can serve for organisations to achieve a competitive advantage (Archenaa & Anita, 2015). Thus, a data-driven culture must be established to grant organisations an opportunity to leverage the knowledge derived from analysed data.

It is believed that business analytics allows business practitioners to make better-informed decisions, and more importantly, to transform businesses to operate

more efficiently (Evans & Lindner, 2012; Delen & Demirkan, 2013). There are three main categories of analytics. Firstly, prescriptive analytics recommends possible solutions to aid in decision-making when a given situation is encountered. It does so by analysing data through configured simulation algorithms that suggest the best course of action (Delen & Demirkan, 2013). Secondly, predictive analytics is driven by different statistical algorithms, machine learning and data mining models to predict the likelihood of a future outcome based on analysing historical or past performance data. The extrapolations provide new insights to businesses and thereby allows them to create novel products and services and be further ahead of their competitors (Elgendy & Elragal, 2016). According to Eswari, Sampath, & Lavanya, (2015), "the architecture of predictive analysis system includes various phases like data collection, data warehousing, predictive analysis, processing analyzed reports" (p.205). Lastly, descriptive analytics are the most frequently used analytics by businesses. This analytics performs calculations on existing data to understand current and past business practices to determine the root cause of a problem or to give a reason why a particular outcome, failure or success has occurred (Evans & Lindner, 2012; Hidden Brains, 2017).

Consequently, the era of big data has led to further improvements in the area of analytics giving rise to new techniques of processing and analysing data to generate BI (Russom, 2011). Many companies that operate in complex and fast-paced environments have shown great interest to adopt and implement BDA (Govindan, Cheng, Mishra, & Shukla, 2016). Many consider BDA as the next frontier to drive innovation, productivity and competition (Evans & Lindner, 2012; Manyika et al., 2011; Neves & Bernardino, 2015).

Philpott (2010) highlighted that analysis, which makes use of big data mining technologies and quantitative methods such as mathematical algorithms, statistical computing and stochastic process, are generally categorised as advanced forms of analysis. BDA is made up of advanced analytic tools that make use of advanced algorithms, machine learning techniques and the different methods of data mining (Lee, Kao, & Yang, 2014).

Big data technologies, such as the Hadoop Distributed File System (HDFS), have allowed data analytics to be performed in real-time through analysis of large volumes of data sets of different structure (Archenaa & Anita, 2015; Oussous, Benjelloun, Lahce, & Belfkih, 2018). HDFS is an Apache open-source system that can collect and process an extremely large volume of data and produce reports (Kumar, Eswari, Sampath, & Lavanya, 2015). It can serve as an analytic tool and also as a data collector.

As most companies around the world are embarking on various projects to implement big data, new big data frameworks and models are also evolving to cater for more storage capacity and processing of data in real-time. Different frameworks have been developed to outline the big data technology architect (Archenaa & Anita, 2015). Archenaa & Anita (2015) developed a big data framework, which can assist in decision-making, called Big-Data Analytics and Decisions (B-DAD). New applications, data models, technologies and hardware have been developed to accurately process more reliable BDA.

2.3 Era of Big Data Analytics

The amount of data generated and exchanged by many companies and consumers on social media platforms such as Facebook, Instagram, LinkedIn, Youtube, Google+ and Twitter, through the Internet of Things (IoT) via connected devices and network sensors, has increased massively (Abawajy, 2015; Kubina, Varmus, & Kubinova, 2015; Najafabadi, et al., 2015). These types of datasets are in the form of structured and unstructured data such as textual content, audio, images and videos (Al-Badi, Tarhini, & Khan, 2018; Kubina et al., 2015). Manyika et al. (2011) further confirm that social media sites store large amounts of data through the internet on devices such as smartphones, desktops and laptops. These devices have made it possible for people and organisations around the world to contribute massively to the concept of big data. Embedded sensors in devices such as mobile phones, energy meters, industrial machines and automobiles have made it easy for data to be harvested.

Conceptually, the term big data means many things to many people. According to Elgendy & Elragal, (2016), it is datasets that grow so large that they become awkward to work with using traditional database management systems. Gartner (2013) defines it as "high-volume, high-velocity and/or high-variety information assets that demand cost-effective, innovative forms of information processing for enhanced insight, decision-making, and process optimization" (p.1). In other studies, it is well defined by its economic value and veracity, which refers to the reliability, consistency and certainties of the quality of data being stored (Commonwealth of Australia, 2013). Manyika et al., (2011) defines it as “datasets whose size is beyond the ability of typical database software tools to capture, store, manage and analyse” (p.1). However, big data traits such as velocity, volume and variety, have gained a lot of publicity for being associated with big data (Davenport & Patil, 2012; IBM, 2018), while new terms such as veracity and value have also been added to the definition of big data. As aforementioned, big data requires powerful technologies and complex algorithms to derive any meaningful insights from it.

Big data on its own is made up of different phases; BD generation, BD storage, BD acquisition and BDA. The generation phase consists of multiple data sources that generate large volumes of data at real-time. The acquisition phase is where data is collected, transmitted and pre-processed. The storage phase stores a large amount of data, in any form, while making sure that it’s easily accessible and reliable. BDA tools and techniques examine and analyse big data (Al-Badi et al., 2018).

BDA can also be defined as “a holistic approach to managing, processing and analysing the 5 V data-related dimensions (i.e., volume, variety, velocity, veracity and value) to create actionable ideas for delivering sustained value, measuring performance and establishing competitive advantages” (Wamba, Akter, Edwards, Chopin, & Gnanzou 2017) (p. 356). Manyika et al. (2011) stated that BDA is “the next frontier for innovation, competition, and productivity” (p.1), while according to Hagstrom (2012) it’s a new paradigm of knowledge assets.

The ability to derive new knowledge from technologies such as big data can assist companies to realise new growth and competitive advantage (Côrte-Real et al., 2017; Kubina et al., 2015). New insights can be derived when external data and a company's past performance is integrated to understand market and customer behaviour.

2.4 Exponential Growth of Big Data

As stated by Sivarajah et al. (2017), "established data processing technologies, for example, database and data warehouse, are becoming inadequate given the amount of data the world is currently generating" (p.264). By 2020, the amount of data generated will be approximately 40 zettabytes (Gantz & Reinsel, 2012). Daily, the world produces an average of 2.5 quintillion bytes of data of which 90% is unstructured (Dobre & Xhafa, 2014).

Although datasets are created as a by-product of business core processes, their intrinsic value is not thoroughly exploited (Boiten, 2016). The increase in data is as a result of a number of factors which are not limited to the following:

- Increase in social media engagement and usage by individuals and organisations (Commonwealth of Australia, 2013; Manyika et al., 2011).
- Consumers create extensive trails of data daily as they communicate, share, search, browse or buy products (Philpott, 2010).
- The proliferation of connected devices through the IoT generates a lot of unstructured data such as videos, audios, social media feeds, geolocation, pictures etc. (Commonwealth of Australia, 2013; Manyika et al., 2011; Sivarajah et al., 2017).
- Increase in technology-driven activities from analogue to digital. Most companies are now automating their processes to maximise operational efficiencies for maximum profits (Sivarajah et al., 2017).

2.5 Drivers of BDA Adoption

As mentioned by Archenaa & Anita (2015), traditional database platforms are incapable of handling large volumes of data, as they lack scalability, experience slow performance and lack accuracy. Previously, before the advent of BDA, most companies were not able to store data for long periods, nor have effective technologies to manage large volumes of data.

Although there is not enough proof that South African companies have adopted the BDA technology, there are, however, key drivers that can push them to adopt the technology. It is an almost certain fact that data is a valuable asset to many companies, but many of them are unable to leverage the supremacy of the insights that can be derived from it. As such, many organisations have begun to implement BDA with the sole purpose of extracting valuable information that will aid in giving them a competitive advantage and boost their business performance (Kubina et al., 2015).

Similarly, the knowledge of consumers' needs is now more advanced, putting pressure on most companies to offer real-time services to meet their customer's demands. Increased competition is compelling them to adopt real-time analytics to boost their performance and achieve a competitive advantage. Many studies have confirmed that BDA gives companies a competitive advantage (Côrte-Real et al., 2017; IBM, 2018; Sivarajah et al., 2017; Wamba et al., 2017). Correct implementation of BDA can allow companies to improve their operational efficiency, create new revenue streams, and drive competitors out of business (Brynjolfsson, Hitt, & Kim, 2011; Sivarajah et al., 2017). As such, BDA offers solutions to the challenges faced by many companies and has the potential to transform organisations and the entire sector in which they operate (IBM, 2018). Just about 54% of respondents from a survey conducted by Savitz (2012) in various companies cited that enhanced customer experience was the reason most companies have implemented BDA. Thus, it is quite clear that most companies can leverage their data to achieve a competitive advantage, which can be as a result of making informed decisions on the market trends, customer's

needs, product improvement and development, distribution channels, competitor analysis and employee management.

2.6 Impact of Organisational Factors on BDA Adoption

It has been observed from various literature sources reviewed that the emergence of big data has provided greater convenience to most businesses while bringing its own challenges and risks to adopting the technology (Kubina, Varmus, & Kubinova, 2015; Wamba, et al., 2017; Wang, Gunasekaran, Ngai, & Papadopoulos, 2016). However, the factors, which can influence or inhibit the adoption of BDA, can either be internal or external to the organisation. The current study is focused on both the internal and external factors to determine the appropriateness, relevance and feasibility of adopting and implementing BDA in the XYZ financial services group.

According to Vela (2017), internal and external factors are, but not limited to, the following; resource skills and capabilities, IT skills and infrastructure capabilities, financial resources, organisation characteristics, industry pressure, competition, governance and regulations. Implementation of technologies required to build BDA will require extra funding and this factor can have a significant impact on the adoption of the technology itself. The most difficult challenge with BDA is acquiring and retaining people with high-quality analytical skills. In addition, BDA implementation requires strong management buy-in and commitment for it to be realised; without this, it will be a project which will die a natural death through becoming either a symbolic project, deadwood project or a mere white elephant.

Noteworthy at this stage is that the advent of big data has resulted in numerous regulatory issues, risks and challenges for most businesses, and for this reason, it is important for data governance to be enacted to address this concern (Akoka, Comyn-Wattiau, & Laoufi, 2017; Khatri & Brown, 2010). This is to ensure the effective management of large volumes of data being generated, collected and collated to assist in decision-making processes using different analytical tools (Al-Badi et al., 2018). In his article, Tallon (2013) discussed the different practices of big data governance for creating a balance between risk exposure and value

creation to maximise the value and create a competitive edge. It has been noted by many scholars that most governance of big data battle with data privacy, data governing, data cleaning and data management. Governance will enforce data quality and its use (Otto, 2011). Akoka et al. (2017) created a big data governance framework (Figure 2) to guide and manage big data.

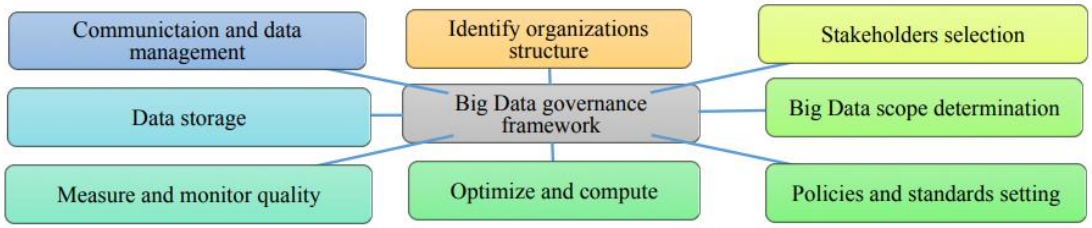

Figure 2: Big Data Governance Framework (Akoka, Comyn-Wattiau, & Laoufi, 2017)

The government should set out rules for information management and data usage standards to assist in framing policies, standards and processes. This is required to ensure integrity, availability, usability, security and auditability of big data (Akoka et al., 2017).

2.7 Status of Big Data Analytics Adoption in South Africa

As per Evans & Lindner (2012), analytics have a strong business case; for every $1 invested, there is a $10.66 value in return. Companies such as IBM (2018) have also realised the need and formed a 4000 person division dedicated to business analytics. Gartner (2019) further alluded that business analytics is the top technology priority for most chief financial officers and chief information officers (CIOs).

Despite the many claims that BDA generates business value, many businesses are still uncertain as to whether to implement it or not. The knowledge and challenges faced by many organisations are still unknown (Gupta & George, 2016; Mikalef et al., 2018; Wamba et al., 2017). The article by Wang, Gunasekaran, Ngai, and Papadopoulos (2016) highlighted that BDA has been implemented in companies that operate in fast-paced and complex environments.

In a study conducted by Bain surveying 334 executives, 30% of these executives said they lack a clear strategy for embedding data and analytics in their companies (cited in Breidenthal, Diepeveen, & Brahm, 2018, p. 1). Companies which invested in BDA, 69% of them have no infrastructure in place. Even though other South African companies are well aware of the value and benefits of big data, it is not known why the rate of adoption and usage of BD technologies is low (Malaka & Brown, 2015).

Other South African companies have shown an interest in technology. This is evident from IT News Africa (2018) which showed a partnership of a South African company, Moyo Business Advisory, teaming up with a high-tech company from Israel to deliver effective BDA services to the South African market. Strategy Worx (2013) attributed the lack of vision by South African companies as the cause of delay in BDA adoption. This was affirmed by IT News Africa (2018) reporting that South African corporate executive leaders lack an understanding of BDA. Hence there is a slow rate of adoption and implementation of the technology. It was further highlighted in the same report that South African CIOs are fully aware of the benefits of BDA, however, they lack an understanding of the full impact of BDA on their businesses. Breidenthal et al. (2018) also reported that South African executives are battling to grasp BDA and that they are still trying to figure out how BDA can create value to their businesses. This serves as proof enough that most South African CIOs or executives lack strategic thinking when it comes to technologies such as BDA.

2.8 Big Data Analytics: Technology Adoption Models and Theories

2.8.1 Technology Acceptance Model

According to Brock & Khan (2017), many scholars have tried to assess the level of BDA acceptance using models such as the technology acceptance model (TAM). Continuous changes and disruptions created by constant technological changes are a big threat to the already established business models, while

concurrently creating more opportunities to create novel products and services (Lai, 2017). Some technology theories and models have been enacted to outline how consumers and organisations should respond to the emergence of new technologies. They are, but not limited to; Diffusion of Innovation (DOI) theory (LaMorte, 2018), Organisational Learning Capability (OLC) (Brock & Khan, 2017), the Technology Organization Environment (TOE) framework (Tornatzky and Lemer, 1992), Theory of Reasoned Action (TRA), Task-technology fit (TTF) theory, TAM which has different versions (Scherer, Siddiq, & Tondeur, 2019), and the unified theory of acceptance and use of technology (UTAUT).

TAM predicts the likelihood of individuals accepting and using a new technology (Lee, Kozar, & Larsen, 2003). DOI, also referred to as technology readiness, is key to the implementation success of organisations as it is market focused. The theory suggests that an idea or a new technology will gain momentum over time and diffuse into the population. Subsequently, the new product or innovation, behaviour or idea will eventually be adopted by society, whereas, some will initially opt to adopt whereas others will not (Dearing & Cox, 2018; LaMorte, 2018).

2.8.2 Organisational Learning Capabilities

In Brock & Khan's (2017) research they further looked at the OLC framework in conjunction with TAM. This is mainly because TAM is only concerned with system adoption and not with human capabilities. According to Fairchild and Mackinnon (2009), "organisational learning capability (OLC) is a pivotal factor for adoption of system and technological solutions" (p.2). Many scholars have emphasised the importance of training to users of the system before implementing a new technology (Huang, Liu, & Chang, 2012).

2.8.3 Technology Organisation Environment

The TOE framework implemented by Tornatzky and Lemer (1992) can also be a good tool to assess the readiness of a company to implement BDA (Figure 3). The model allows the organisation's skills, resources, technology infrastructure

and external factors to be effectively assessed. According to Tornatzky and Lemer (1992), complex technologies such as those required to implement BDA can be very costly for an organisation to adopt and requires considerable acceptance and adaptation by employees.

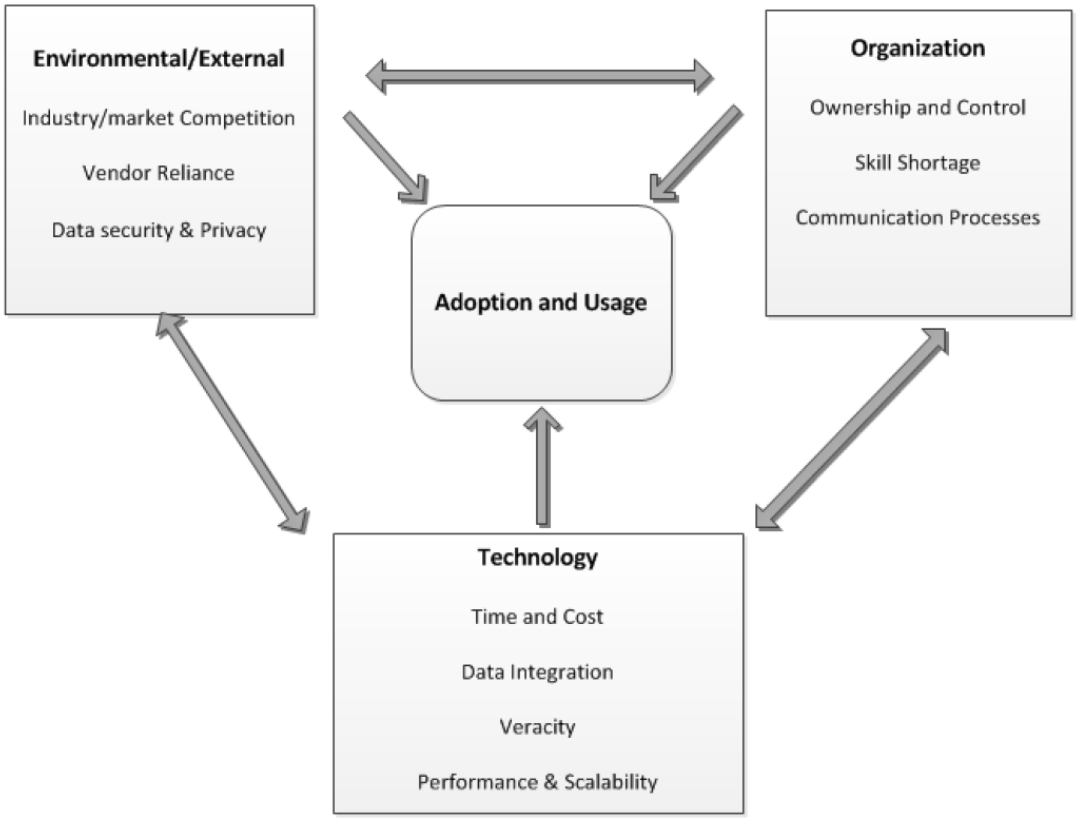

Figure 3: Big Data adoption TOE framework (Tornatzky & Lemer, 1992, p.x)

A similar model, big data analytics capabilities (BDAC) has been used in various big data adoption studies (Akter et al., 2016; Côrte-Real et al., 2017; Kalema & Mokgadi, 2017; Wamba, et al., 2017), each testing the state of adoption and the intentions of companies to implement big data technologies with the aim to evaluate the business impact upon implanting BDA.

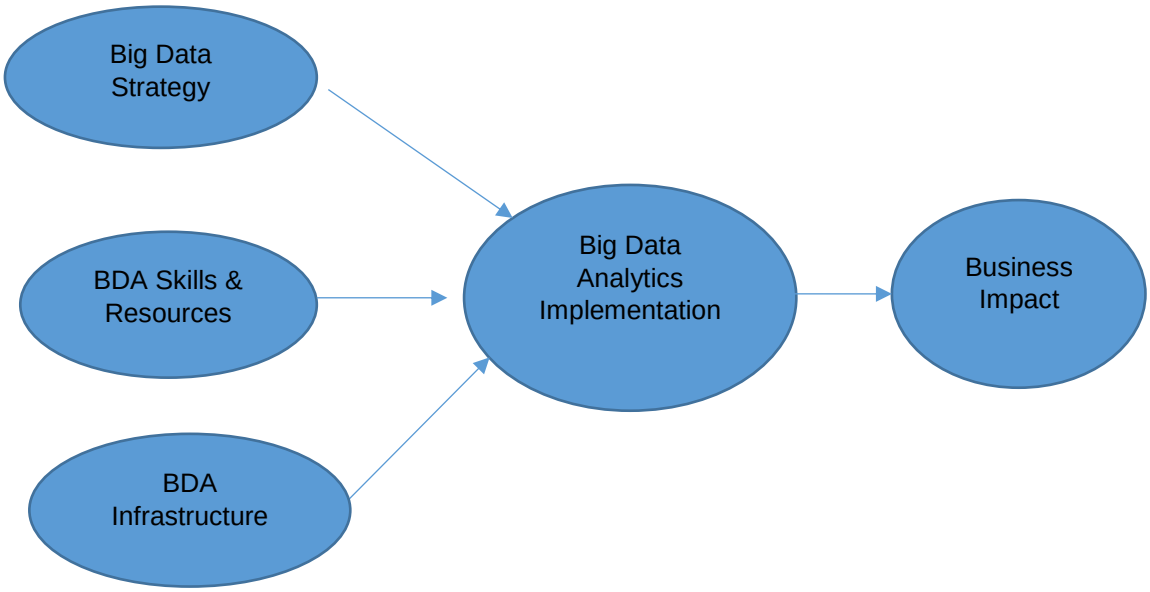

Figure 4: Model of BDA implementation (Wamba et al., 2017, p. 358)

The model presented in Figure 4 is in line with the information extracted from the emerging literature on BDA, which is well supported by the TOE framework (Akter et al., 2016; Côrte-Real et al., 2017; Kalema & Mokgadi, 2017; Wamba et al., 2017). These studies have shown that BDA strategy, BDA skills and resources and BDA infrastructure can effectively allow a company to achieve BDA capabilities. Companies with effective BDA capabilities can easily achieve a competitive advantage and boost their performance. Similarly, Wamba et al. (2015) argue that the positive impact of BDA on business is achieved when certain complementary dimensions of BDA are at play. As such, companies must first acquire technological skills and the right technology, then develop a combination of data, technological, human, and organisational resources to create effective BDA capabilities, which are difficult to replicate and transfer, in an effort to build a competitive edge (Vidgen, Shawb, & Grant, 2017).

To assess an organisation and its readiness to adopt new technology, in line with the objective of the current study, the TOE and BDAC models seem to be more appropriate to apply. This is mainly because the other models are more focused on one aspect of the organisation, whereas TOE and BDAC encompass the

whole organisation and its external factors, allowing internal factors such as human skills, technology resources, technology infrastructure, and external factors to be effectively assessed. Furthermore, BDAC can be used to evaluate the business impact of BDA. The two models take into account internal and external factors that have an impact on new technology adoption.

Models such as DOI, OLC and TOE, outline how the organisation should respond to the emergence of new technologies and the acceptance by users over time. Also, TAM is only concerned with system adoption but not the human capabilities, whereas DOI assesses the adoption of new technology over time when it gains momentum and diffuses into the population. OLC focuses on the importance of training to users of the system before implementing a new technology.

2.9 Conclusion

In conclusion, this chapter has reviewed the literature of the main concepts and theories informing this study. To begin with, it reviewed the literature regarding the evolution and conceptualisation of BDA and Big Data. It also went to review the literature about the drivers and motivation for adopting and implementing BDA. The chapter also reviewed the literature about the status of South Africa's BDA before discussing the theories and models this study has been informed by. The next chapter will focus on presenting and discussing the methodology of this study.

CHAPTER 3

3 RESEARCH METHODOLOGY

3.1 Introduction

The study was conducted in a South African financial services company, with headquarters in Johannesburg. It is referred to as XYZ financial services group, to conceal the identity. The following is an outline of the research instruments, methodology, design and approach employed in the current study to answer the research questions. Also, the chapter presented and discussed how sampling was done, likewise, how data collection, data analysis and presentation was conducted.

3.2 Research Philosophy

According to Neuman and Robson (2014), a research philosophy is perceived as a paradigm that organises frameworks for research or theory. Therefore, the research philosophy tends to be comprised of models of quality research, basic assumptions, methods of answering questions and key issues of approaching the phenomenon under study. Broadly, according to Neuman and Robson (2014), there are five research philosophies, namely critical social science, positivism, feminism, postmodernism and interpretivism. However, due to the qualitative nature of this study, it is informed by the principles of interpretivism as it is based on examining the competing factors that could explain why the study company is reluctant to adopt and implement BDA.

3.3 Research Approach

Broadly there are more or less three research approaches. These are the mixed, qualitative and quantitative approaches. Given the need to have an in-depth understanding of the phenomenon under study this study employed the

qualitative approach. The main aim of the research was to critically understand how and why there are delays in adopting and implementing the BDA approach in XYZ financial services group despite its obvious advantages over the traditional approach. This justifies and makes the employment of a qualitative research approach not only appropriate but also relevant.

Qualitative research is an approach of research that situates the researcher into the world with different interpretations and realities. The world in itself is neither uniform nor understood from the same wavelengths. The same world is a mere construction of human thoughts, histories, and social interactions, thus, it is by no means uniform or similarly understood (Neuman, 2014). Pursuant to this, the foregoing tends to play an important role when labelling, interpreting or attach meanings to the world or any phenomenon in it (Creswell, 2007), in this case why there is a delay in adopting the BDA in the study company.

In line with these conceptualisations, this research approach is based on the philosophy of interpretivism, which is concerned with attempting to interpret the world according to the how those who are viewing, experiencing, living or interacting with it perceive it. In this case, the interpretation of why there are delays in discarding the traditional approach and replacing it with BDA. To this end, the researcher inquired into individual perceptions, meanings, views and interpretations of the phenomenon under investigation. Thus, the most commonly used qualitative data gathering method, namely face-to-face interviews, was used to solicit data from the respondents.

This qualitative study is both descriptive and explanatory. Thus, its purpose is to lay bare the in-depth understanding of the determining factors that account for how and why there are delays in discarding the traditional approach and replacing it with BDA in XYZ financial services group. As argued by Creswell (2007), qualitative studies are carried out where the phenomenon under study is poorly understood and needs a proper explanation. In this case, it is about understanding and explaining how and why there are delays in discarding the traditional approach and replacing it with BDA in XYZ financial services group. Also, qualitative studies are conducted to find out why and how different people

in different settings tend to have differences in the manner in which they define, view, conceptualise or understand social realities; in this context, why there are delays in discarding the traditional approach and replacing it with BDA.

3.4 Time Horizon

The time horizon used in the study was cross-sectional and interviews were conducted over seven weeks, from December 2018 to January 2019. This timeline allowed for follow-up interviews to be conducted as necessary.

3.5 Data Collection Method

3.5.1 Interviews

According to Babbie and Benaquisto (2010), an interview is a loosely but formally designed interaction between the researcher (the interviewer) and the interviewee. Accordingly, the researcher had to use open-ended questions that specifically suit this approach of collecting data. To maintain uniformity in the current study, the same questions were used when soliciting data from different respondents at all levels (Annexure A).

Interviews were conducted through face-to-face interactions with the respondents. Officials with influence on the strategic and policy-making decisions of the company as well as the IT senior management and data specialists at XYZ financial services group were interviewed. This interview method was chosen because it has the opportunity for greater flexibility in eliciting and soliciting information. In addition, the researcher had the opportunity to observe both the subject and the total situation. Through this method, the interviewer has the chance to repeatedly and continuously probe for further illustrations and elaborations from the respondents. This would enable the respondents to clarify their responses.

The primary reason for choosing this method was because of its inherent merits, including but not limited to: yielding mostly undiluted and in-depth understandings

of different individuals, and it is the one commonly used data collection instrument among qualitative studies (Yin, 1994; Ritchie, Lewis, & Elam 2003). The method ensures that the phenomenon under study is critically understood as it respects a vertical orientation understanding of the phenomenon. As such, this method has five core features that make it appropriate for this study: face-to-face orientation ensures that the interviewer can capture some essential non-verbal speeches communicated by the respondent; it has the inherent merit of merging flexibility and structure; it permits further probing; it allows for deeper exploration of the phenomenon; and it allows for critical knowledge generation.

3.5.2 Target population

The research is targeting a large financial service provider based in Gauteng province, in South Africa. The company was chosen as it is seen as one of the most technologically innovative and advanced financial companies in South Africa. Thus, the purposively-selected target population consists of the officials that influence the strategic and policy-making decisions of the company as well as the IT senior management and data specialists. The target population of this study is heterogeneous in nature as those officials who have influential voices in the policy and strategic decision-making in the company are from different experience, professional, academic and intellectual backgrounds.

3.6 Data Analysis Methods

The process of data presentation and discussion is done to draw inferable conclusions from the data collected regarding the phenomenon under investigation (Babbie and Benaquisto, 2010). Thus, this process has to do with attempting to attach meaning to the collected data. Due to the qualitative nature of this research, qualitative methods to do data presentation and discussion were used. The method used thematic analysis, the most commonly used method to present and analyse qualitative data. Hence, all the data collected in the current research, using interviews, were presented and discussed using thematic analysis. The primary reason that this method was chosen was that it permits the

derivation of big data themes and patterns from the pool of the collected data. To Rice and Ezzy (1999) this method is all about the identification of themes by way of browsing and repeatedly reading the transcribed data. To this end, this method requires the researcher to analyse and record the emerging themes in the pool of the collected data. To extract the themes, the data was first coded by way of grouping data with similar features together. In doing so the emerging themes were easily extracted.

3.7 Ethical Issues

3.7.1 Seeking Informed Consent

To ensure that the interviewees were in agreement to participate after making an informed decision, the researcher thoroughly explained the duration, nature and the core purpose of the study in the language that the respondents were comfortable with. Furthermore, those to be interviewed were informed that their involvement in the study is voluntary, hence, they were free to withdraw from their involvement even during the process of data collection. Pursuant to this, the research, to acquire credible data, did not use deception or force to solicit data. The participation was done freely and voluntarily.

3.7.2 Respect for confidentiality, anonymity and privacy

This research seeks to report the findings accurately and honestly. Therefore, confidentiality, anonymity and security of the data were strictly taken into consideration.

By protecting the identity of those interviewed, ethics as privacy, anonymity and confidentiality were adhered to. Pseudonyms (R1, R2, R3, R4, R5, R6, R7, R8, R9, R10) were used instead of the real name of the participants to remove all the identifying information and every information that could be used to connect the name or position of a respondent with his or her data. Doing so managed to avoid harm especially to those who disclosed top secret information about the

company.

3.7.3 Authorisation to do the study

Before getting the authorisation of entry from XYZ financial services group an authorisation letter was obtained from the University of the Witwatersrand. The two letters (company letter and participant letter) were essential in helping the researcher to have an easy entry into the company before conducting the interviews (Annexure C & D).

3.8 Limitations

The main limitation that this study encountered was that literature relating to BDA in the financial services sector, especially in the African context, notably South Africa, is limited. To circumvent this challenge, the researcher relied on the BDA literature in general and those in the financial services sector from the developed northern parts of the globe. Also, most of the findings are biased as every respondent demonstrated his or her predispositions, political affiliations and ideologies, biases and prejudices regarding how he or she views why the company has not adopted or implemented BDA. So cross-validating the integrity of the findings given by different respondents was difficult. Nonetheless, to address this problem, the study compared interview and documentary data to cross-validate these findings.

3.9 Delimitations

The study's main focus was on examining how and why XYZ financial services group in South Africa is taking a long time to adopt and implement BDA in its business operations even though BDA has more advantages over the traditional approach that the company is still using. In this respect, it examined the factors (i.e. the motivations, perceptions, interests, biases, predispositions and prejudices) that determine and influence how and why the company is delaying or reluctant to adopt the BDA approach as a new approach for doing business.

Pursuant to this, this dissertation only focused on investigating the reasons and factors that could account for why the situation in the company is like this and not the other way around. This research did not overlap with other areas or issues of the company other than those regarding the delay or reluctance in the adoption and implementation of the BDA in the company.

3.10 Conclusion

The chapter presented and discussed the methodology of the study. Research philosophy, research approach and research design were some of the main elements of the chapter. To this end, it focused its attention on presenting and discussing how sampling, data collection, data presentation and data analysis were conducted. The next chapter presents and discusses the findings of the study which were collected using the methodology outlined in this chapter.

CHAPTER 4

4 DATA PRESENTATION AND ANALYSIS

4.1 Introduction

This chapter presents and discusses the findings of the study. The data presentation and discussion were done systematically by way of addressing the research questions. To this end, each of the research questions were answered by way of presenting and discussing the data collected regarding the questions. Hence, this chapter focuses on systematically presenting and discussing the data regarding the conceptualisation of BDA, motivations for adopting and implementing BDA, which approach should the company go with, and the reasons for the delay in adopting and implementing BDA in the financial service company. Finally, the chapter offers recommendations or measures that the company should adopt to strategically decide whether to adopt BDA, partially or in full, or to not adopt BDA.

4.1.1 Conceptualising Big Data Analytics

It was imperative for this research to define big data when attempting to conceptualise BDA as BDA is essentially a compound of big data and analytics. When explaining what big data is, R2 has this to say:

> *"So the way I understand big data is that it has a couple of characteristics and those characteristics include, not just the size of the data, but also the scale of the data, the multi-dimensions the data has and how variable the data is. So big data to me, examples of it include social media posts, public information, like utility information, external data utilisation that is there, about the environment. It is all the public information that's available out there. Then obviously, that at a scale, because the data is beyond organisation, it is much bigger than just that".*

Similar sentiments are shared by Olshannikova Olsson, Huhtamäki, & Kärkkäinen (2017) who consider big data as a set of both structured and unstructured data that can be obtained from all platforms where people interact through the IoT. In corroboration about the fact that big data is not about size, Brown et al. (2011) emphasise that size may not and is not the only criterion to determine whether the data is big or not. However, one respondent pointed out that BDA is one of the most misunderstood concepts, with most people thinking that data has to be more or big for it to be considered big. In his proposition, “big data just means granular data that does not always need to be big in terms of quantity”.

From the preceding, big data was understood to mean something with three characteristics, namely variability of the data, the number of dimensions in it and that typically it is the external data to the organisation. Furthermore, big data was also conceptualised to mean the kind of data that would allow one to perceive “that you cannot otherwise see” (R2). For R3 Big Data was understood to mean “just large volumes of unstructured data”. This respondent conceptualised it as something that helps in making predictions regarding how things or behaviour of people (clients, customers, consumers, electorate etc.) can unfold based on large volumes of data about their past behaviours. This is consistent with R4’s perception: “So big data is a collection of [a] massively scale[d] amount of information from people”. This respondent used large volumes of data received on such super platforms as Google, Apple, Facebook among others as examples of big data. This corresponds with Najafabadi et al.’s, (2015) statement that technology companies such as Microsoft and Google use BDA for business analysis and key decisions that need to be taken.

According to R4, “one cannot control the traffic, type, amount, nature or form of data on these super-platforms, as users keep on creating it without a defined pattern or volume”. R4 added that “companies in the financial services sector can ceaselessly receive large volumes of unstructured data from their clients, users, customers, consumers, stakeholders or anyone interested in the firm”. In support of this, Manyika et al (2011) perceive big data to mean “datasets whose size is

beyond the ability of typical database software tools to capture, store, manage and analyse" (p.1). However, other respondents argued that big data is both structured and unstructured. For them, most of the data in the form of videos and pictures are those considered to be unstructured while most of those that are in the forms of texts are largely structured.

4.1.2 Big Data Analytics

Cognisant of the varied perceptions of big data that emerged from the interviews, it transpired that the concept of BDA has conception pluralism. For R6 BDA is "but a buzzword, a word that has been thrown around for lots of things". Many respondents defined BDA differently since there is no one single universally agreed definition of the term. Furthermore, none of the interviewees had a good appreciation or understanding of what BDA really is. Despite their varied differences in the conceptualisation of BDA, some of respondents found convergence in the idea that BDA revolves around the use of computational analytical tools or "big data technologies" in the words of R2, to analyse and interpret big data. These are not limited to the following predictive analytics, NoSQL databases, search and knowledge discovery, stream analytics, in-memory data fabric, distributed file stores, data virtualisation, data integration, data preparation, and data quality. R1 defined BDA as follows:

> *"Okay, so I see big data, firstly, Big Data Analytics is obviously analytics that uses big data. Big data analytics is a technical term that deals with really massive messages, which are orders of magnitude bigger than traditional data. Big data kicks in when you have [a] massive data set, not just varied one. So if you ask Google, what will it say?… It says extremely large datasets that may be analysed computationally to reveal patterns, trends and associations, especially relating to human behaviour and interactions".*

This definition is consistent with the one given by the interviewees who conceive BDA to mean the process of gathering huge volumes and forms of data, structured and unstructured alike, "applying analytical tools to extract useful

trends or value from all the various data types" (R5). R6 tried to give an all-encompassing definition of BDA:

> *"So I see it as being a broad concept that describes almost like the next iteration of data analytics and dealing with really, really big data sets and probably contains both structured and unstructured data that are collected from a range of sources and are analysed using non-traditional techniques".*

BDA has been widely understood as the act of gathering, processing, analysing, interpreting and attaching meaning to big data that is either structured or unstructured, through the use of analytics or big data technologies. This is done to assist a company in predicting the behaviours, needs and demands of their stakeholders (customers, clients, consumers, government, international community etc.). In doing so, BDA will go a long way in giving companies a competitive advantage as it will meet its stakeholders' demands and needs. Businesses using BDA tend to be well informed of the dynamics of the business environment, and they will use the same knowledge to craft context-specific solutions to address certain problems or challenges in a specific area at a given time. BDA tends to compel businesses to be more proactive than reactive as it assists the businesses to plan in advance using the gathered, processed, analysed and interpreted big data (Akter et al., 2016, Côrte-Real et al., 2017, Manyika, et al., 2011).

BDA has as its essential features, the characteristics that define it, namely structured or unstructured data accumulated in real time, variability and large volumes of data. This is even though some interviewees would like to believe that what characterises BDA is not big data, i.e. large volume, but rather the unstructured nature of the data. This is in line with the literature which says that the bulk of the data is largely unstructured. For example, Dobre and Xhafa (2014) state that the world produces an average of 2.5 quintillion bytes of data of which 90% is considered unstructured data.

Furthermore, BDA is characterised by the use of modern computer-based, rather than traditional, methods of analysing data as per the findings from interviews conducted. Most interviewees were in agreement that BDA is characterised by three Vs, namely variety, velocity and volume of data that can only become useful when interpreted and analysed by relevant technical instruments and when the right questions are asked about its relevance and utility to the purpose that it wants to serve. This finding is consistent with the literature, for example, Davenport & Patil (2012) and IBM (2018), who argue that these three features and veracity of BDA have gained a lot of public attention as the defining fundamentals of BDA. Similar sentiments have been echoed by Kitchin and McArdle (2016). However, Mishra et al. (2016) added that value and variability are other essential characteristics of BDA.

The interviews further established that BDA is associated with deployment and employment of the real-time data processing to instantly get outcomes of the processed large volumes of data in a bid to quickly and effectively respond to the needs of the stakeholders. This only means that with BDA one can easily become aware of the things or issues or problems one was not aware of and could not have been aware of without BDA.

4.1.3 Motivations/reasons for adopting BDA

The respondents revealed various motivations for a company to adopt BDA. However, there are sharp divergences and convergences between these motivations as well as overlaps between and among them. Many respondents seemed to have found agreement in the need for BDA to achieve the following: to fully understand the problems and challenges facing the organisation at a particular point-in-time; to understand the root causes of these problems and challenges; the impact and nature of the problems, and challenges and how to resolve them in the shortest possible time; their patterns and how, when and why they originated; and how to effectively and efficiently deal with them to promote good performance; greater productivity and business profitability. Also, a kind of agreement was found by the respondents in treating BDA as an effective

instrument to determine where the organisation is at a given time when to get to where it wants to be and how to get there.

Thus, BDA is being treated as both the means of revealing the organisational state of affairs, its mission and vision as well as how, why, when and what to do to get to where it intends to be. With BDA, one can effectively, efficiently and swiftly analyse complex, large-scale data to get results that could save the organisation from an existential threat or to give the firm a competitive edge in the industry. In these times, BDA is preferred as it does what the traditional approaches cannot do. Handling large volumes of unstructured and unprocessed data improves accuracy and it has the advantage of scalability, something that is unheard of in the traditional approaches (Archenaa & Anita, 2015).

For one respondent adopting BDA is long overdue as, with the advent of the IoT and huge volumes of data a firm can receive in a very short period, “traditional data reporting and analytics can simply not keep up” (R1). This was supported by many other respondents who view the adoption of BDA as the way to go in the 21st century where everything is electronic and as we are now in the Fourth Industrial Revolution. For example, R8 advocated for the integration of all the data of a firm into one dataset, which is accessible to everyone so that whenever a problem needs to be solved everyone involved has to be in the know about what is going on in the company. He proposed that this could be done through modelling the firm’s founding objectives, mission and vision into BDA processes. Similarly, Gobble (2013) and Strawn (2012) have identified BDA as necessary for innovating the fourth paradigm of science. In support of this, Mayer-Schonberger and Cukier (2013) consider BDA as the 21st frontier for productivity, innovation and competition.

However, one respondent says that ‘while it might be beneficial for the firm to adopt BDA there are other variables such as data sovereignty and data security to consider when proposing its adoption’. In his narration, he mentioned that “some countries have legislation that outlaw the act of making their data go outside their borders, something which may impact negatively on those companies with a global reach”. In such circumstances, XYZ financial services

group, whose head office is in South Africa, cannot have privy to some data generated or received by its subsidiaries around the globe largely because of the challenges of data sovereignty and data security in different countries. To this end, it is advisable to balance the need for adopting BDA and the practical side of doing so in the face of such challenges.

4.1.4 BDA or the Traditional Approach: Which is good for the Company?

Different perspectives, characterised by intense contestations, paradoxes and convergences, emerged from the investigation as to which data analysis approach is best suited for XYZ financial services group. The differences and convergences are associated with affordability, efficiency, capacity, data sovereignty and security issues, profitability, responsiveness and effectiveness of either of the two approaches when it comes to analysing data whose main characteristics are high variability, velocity, variety and volume. Also, issues to do with the ability of the employees to effectively and efficiently use BDA loomed large. Interestingly, some preferred them both so that they will work hand-in-hand in a manner that one's weaknesses are solved by the other while one's strength is complemented and augmented by the other.

Further to this, one respondent, R5, pointed out that he supported BDA over the traditional approach "as it makes the most sense with what we are doing with device data". However, he clearly stated that his wishes to implement BDA was thwarted when he was told that the company lacked the human capital to venture into the project of implementing BDA. For one respondent, R7, it is preferable as it is good for the firm to use both approaches simultaneously so that one can be used to do what the other cannot do effectively and efficiently:

> *"It has to be both. The reason being that because they serve different needs. So the big data is about understanding a complexity that I did not know about whereas traditional data is about giving me the traditional analytics, is about empowering me to control my burden and the power of empowering me to manage my business. Therefore, traditional analytics is about managing my business and determining future strategies".*

Somewhat in corroboration with this, another respondent, R3, pointed out “there is a need to know the learning curve before adopting a fully-fledged BDA in the company”. R3 further stated that “despite the obvious advantages of BDA being able to quickly collect, collate and process large volumes of unstructured data, moving towards BDA has to be informed by the need for that [and] not just because everyone is going towards that direction”. To this end, R3 indicated that “when there isn’t time for learning [it] is a bad idea to go by or adopting BDA in the company”. That being the case, a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis has to be done considering the adoption of BDA, otherwise, it may not serve the purposes of enriching the company. This respondent also pointed out that the company should have explored adopting BDA some years ago when the company had less pressure from customers. This means that, according to this finding, the company is in a precarious position on whether to adopt BDA over the traditional approach because now the company has intense pressures from many customers around the globe. However, some findings have established that the benefits of adopting BDA are only long-term, and should not be viewed as short-to-medium term benefits. Therefore, the traditional approach is preferable over BDA for short-to-medium term benefits.

Relating to this, one respondent, R9, said that “adopting BDA will only be relevant and good when it is saving the business objective of the firm, without which will be mere getting into the bandwagon of something that is not in line with your business model”. To this end, adopting BDA when it is not saving the business objectives of the company is wasteful as it is unproductive, unprofitable, inefficient and ineffective. This was supported by yet another respondent, R2: “I don't think [that] big data will change a lot in the manner in which the company do its business”. He went on to say that “whereas I think on proposition development stuff, big data is sitting strongly behind that.” This is evidence that BDA is not a panacea to the financial firm’s problems and challenges, and BDA will not be the solution if it is not properly integrated into the business model of the company.

4.1.5 Reasons for the delay in adopting BDA

There is a general consensus that the company has not yet adopted BDA, however, there are small signs of its existence in the use of Elasticsearch and Kafka at the company. Responses such as “have not implemented anything at all”, “No, not yet”, “A little bit”, “we haven't implemented any of the big data technologies or techniques in our organisation” are among the responses regarding whether the company has adopted BDA or not. At policy level, XYZ financial services group is still using the traditional approach, and not BDA in the collection, collation and analysis of data. Interestingly, the reasons for the delay or reluctance to adopt BDA as the new normal in the firm are noteworthy as they are intriguing, contested, paradoxical and contentious. Nevertheless, there is also a general consensus that BDA is more preferable than the traditional approach owing to its advantages in easing the way of doing business as well as in aiding the firm to be more profitable and productive. Hence, it is a paradox: having an approach which is very efficient, fast, effective, productive and profitable yet the company is taking a long time to adopt it.

Generally, as one respondent said, R5, the reasons for non-adoption are like “a chicken and egg situation.” One reason that constantly came out from the findings to this effect of chicken and egg situation is that the company does not have adequate, both qualitatively and quantitatively, human capital for BDA at the moment. On this one respondent, R1, said that “you need computational power to do the stuff…. And you just need enough processing power, quite a different mindset… And you need quite a lot of expertise”. These essentials, according to the findings, are lacking in the company. Thus, the initiative of adopting BDA could be great when it comes to increasing the profit margins and the efficiency of the company, but if there is no adequate and credible human capital to champion and drive it, then nothing can take off in this regard. One respondent categorically stated that ‘the company has serious skills challenge when it comes to BDA’.

Cognizant of this, it is plausible, though not encouraged, for the firm to delay adopting and implementing BDA until it has credible and adequate human capital

to do so. To mitigate this challenge, it has been submitted that the company has to upskill its personnel should it want to see BDA improving its performance, productivity, profitability, efficiency and effectiveness. Thus, training and development programs on BDA related issues are key before the company can think of adopting the new system. There is a need for the company to allocate adequate resources (financial, time, human capital, information etc.) for these training and development programs. In support of this, one respondent reported that “Well, we need to invest in data analytical skills, we need to have a proper strategy in the long term”. This shows the importance of proper skills base before venturing into adopting and implementing a sophisticated and complicated system such as BDA in any organisation.

Further, regarding the delays to adopt BDA, the company’s business model is not yet aligned with BDA. For BDA to be the new normal, requires alignment of the firm’s mission, vision, core values and business model with the functionalities of BDA. Without this alignment, BDA would not be of any consequence. This may be interpreted to mean that the company, as stated by one respondent, ‘is yet to figure out how its business model can be aligned to BDA to have a competitive edge in the financial services industry’. Breidenthal et al. (2018) highlighted the risk that “Many will rush to invest in the latest analytics software and infrastructure vendors and hire data scientists, but the ultimate winners will align these investments with their strategic and organisational needs in ways that lead to action and results” (p. 1). As such, it is imperative to have proper alignment of the organisation’s strategic goals and BDA initiatives to realise its full potential.

Moreover, even though BDA has inherent advantages of efficient and effective reporting and proposition development, as well as bettering the company’s performance, productivity and profitability, such inhibiting factors like financial constraints are still presented as obstacles for its adoption and subsequent implementation in the company. It has been established from the findings that there are no adequate financial resources to bankroll the BDA initiative in XYZ financial services group. With this in mind, adopting or the implementation of BDA cannot take place largely because it is axiomatic that the best way to stifle or

paralyse any initiative is to starve it financially. Financial resources represent the oil that lubricates for any initiative in the company and inadequacy or lack thereof makes the initiative experience a stillbirth or swiftly becomes a white elephant or a mere deadwood project.

Technical challenges were mentioned as one of the inhibiting factors that account for the delays in the adoption and implementation of BDA by the company. For example, the current computer equipment is not suitable for use with BDA, hence, its adoption or implementation might cause some technical glitches in the current system. The obvious result of this is the poor performance of the system. It has been recommended that the company needs to allocate capital to bankroll any BDA initiative if it wants to see a new system producing desired the results. Commenting on this one respondent stated that “there is need of a sponsor to finance the project of adopting and implementing BDA". In his view, the sponsor needs to be “someone who wants the data and understands big data and has a vision for it, without that the project will not kick-off”. Thus, a needs assessment or cost-benefit analysis should be undertaken to establish the costs and benefits associated with either the adoption or non-adoption of BDA.

A further reason for the delays in adopting BDA is that the company is “still a small company and most of our work can be done by the traditional methods” (R7). The submissions given to account for this come from the fact that BDA is an expensive program compared to the traditional approach. Thus, for a small company, it is advisable to use an approach that is cost-saving rather than the one that is expensive and efficient. The reason is that when a small firm is trying to find its foothold in the industry it has to focus on satisfying the needs of the clients at very low costs. Thus, if traditional methods are able to do what BDA can do, then it is advisable for the small firm to go with the former despite the immense benefits associated with adopting and implementing BDA.

Inexorably linked to the foregoing is one of the reasons that came out from the findings is that it is because the company’s data is not large enough to justify a complex and sophisticated solution like BDA. The company is said to be small, hence, the data it manages is inherently small. This then indicates the continued

use of traditional methods which are both cheaper and efficient enough to manage small data. In corroboration with this while responding to the question regarding why delaying adopting BDA one respondent was quick to point out that “because we don’t have big data”. To this end, it has been submitted that it is important for the company to ‘stick with the sophisticated traditional techniques’, as one respondent reported. However, this is even though the findings have established that BDA can be said to still be applicable even when the data is not that big.

Furthermore, internal politics was considered to be one of the greatest inhibiting factors that could stifle the initiative of adopting and implementing BDA in the company. According to the findings, there is a possibility of fierce tension between those who want the status quo, those who fear the unknown consequences of the change, and those who want to adopt the change. Commenting on this one respondent stated: “I suspect the learning curve, as well as internal politics from people that want to remain with the status quo, will be the biggest challenges”. The reason being is that the status quo-centric people have mastered and perfected the traditional approach, which they consider to be the only way of doing business, whose change or disturbance by adopting a new system would compromise the company’s performance, hence denting significantly on the competitive edge of the firm has built over the years. While on the other hand the techno-savvy, who are change-centric and are prepared to overhaul the system by introducing and embracing a comprehensive and sweeping approach that would radically change the way of doing business in the company for the better, thereby contributing significantly to the company’s goodwill and competitive advantage.

Also, the status quo-centric can be considered anti-change and anti-BDA not because of the absence of the fundamentals to adopt it but rather because of their fear of the unknown consequences that this change can bring, particularly those to do with their job security and sundry. A thorough cost-benefit analysis needs to be conducted to establish who will lose in the process, what kind of compensations are they going to receive, who is going to benefit through the

adoption of the new system and how these benefits are going to be federated or decentralised. This has to be made clear before attempting the adoption or the implementation process otherwise those who perceive themselves as losers in the process are going to play the saboteurs role to advance and promote their interests through maintaining the status. This has been supported by one respondent who stated that ‘the company needs not a “big bang” approach to replace the old with the new.’ For her, there is a need for marginal, incremental changes that would see the adoption of the BDA as an evolutionary process rather than a revolutionary process with unknown and possibly unknowable sweeping and comprehensive outcomes to both the company and its employees.

4.2 Recommendations

From the presented and discussed findings the following recommendations can be made:

- Running the traditional approach and BDA concurrently. This would allow for a smooth transition from the traditional to the new approach without compromising integrity, goodwill and the competitive edge of the firm. Also, this may make the learning curve a bit easier as the changes would not be that sweeping and revolutionary. Furthermore, this would allow the firm to go back to the traditional methods if it finds out that BDA is not working nor workable. Doing it this way will not disrupt the firm's efficiency, effectiveness, productivity, profitability or performance as the traditional approach will still be there as the way of doing business with BDA only serving as an experimental and alternative way. When BDA proves effective, then the old can eventually be put aside to make way for the new.
- Adequate, readily available and easily accessible financial resources have to be put aside to bankroll the installation and implementation of BDA in the company as well for personnel training and development. Further, the company has to set aside financial resources for research and development to gauge the appropriateness, relevance and readiness of adopting and implementing BDA now.
- To address the technical challenges that are inhibiting the adoption and implementation of BDA this research is recommending that the company upgrade its technical resources, particularly computers that are more suitable to store, capture, process and configure big data. The reason being that the old technical resources that the company has are not able to accommodate the functions of big data, hence the need to address this technical challenge through replacing these resources with cutting-edge technological resources that could be accommodative to the workings of big data.

- To streamline the adoption and implementation of BDA, this study is recommending that the company needs to strategically integrate BDA into its core business model, core values, mission and vision. Doing so will go a long way in making BDA part of the new normal in the organisation; a strategic move that would give it as high a priority as the other activities in the organisation.
- Fear of the unknown, which is leading to intense political tensions between the would-be winners and would-be losers when BDA is adopted and implemented, was cited as one of the inhibiting factors. Thus, there is a need for the company to be clear on how the would-be losers can be compensated. Also, the company-leaders have to be transparent about whether they are going to adopt BDA or not to alleviate the fear of the unknown. Of particular importance is for the company to effectively address the fear of the unknown. This could also minimise the negative impact of internal politics, which may be negatively affecting the effectiveness and efficiency of the company.
- Regarding the lack of adequate and properly trained and skilled human capital that are competent with the processes and functions of BDA, this study is recommending an effective and standalone program of training and development on the issues to do with the use of BDA as the new normal of the company. Thus, the company needs to dedicate enough funds to bankroll such programs should it wish to see BDA as a success story. However, one way to address this is to go for a radical approach by systematically eliminating those without the BDA critical skills and replace them with those whose techno-savvy and BDA critical skills are unquestionable. Nevertheless, it has to be noted that this radical approach has serious negative impacts in the short-to-medium, though having advantages in the long run. The reason is that those without critical skills may start sabotaging the effectiveness and efficiency of the company once the decision to lay them has been made and communicated to them.

4.1 Suggestion for future research

Due to the nature of the study, this consultancy report aimed at addressing the problems identified in XYZ company. As such, only one financial service group company participated in this research study. Therefore, a full representative research study is required to assess whether the findings can be generalised to the entire financial service industry or not. A larger population is required to test validity of the results and to yield better results, using both quantitative and qualitative research methods. The impact of context specific factors of BDA could then be better understood, and the outcomes of such a study could be used to provide a background to the interpretation of the findings.

4.2 Conclusion

The purpose of this study was to examine the factors that could appropriately account for the delay in adopting and implementing BDA in the financial company understudy, despite the apparent advantages of BDA in the financial sector. This is against the background that the company, with a global footprint, is actually reacting rather than being proactive in its processes of doing business.

In summary, the study has analysed and discussed the findings of conceptualisation of both Big Data and BDA, motivations and drivers of adopting and implementing BDA and the reasons for the delay by XYZ financial services group to adopt and implement BDA. In this study, the term Big Data was defined as it means different things to many people. Also, findings regarding which between the BDA and the traditional approach to be adopted and implemented were also presented and discussed. The chapter concluded by presenting and discussing the recommendations XYZ financial services group should take into account going forward when planning to adopt and implement BDA.

From the literature and readily available pieces of evidence, it has become common knowledge that BDA has fundamentally transformed and eased the way of doing business, notably in the financial sector. This evidence was also revealed

from the findings of the study. There is an urgent need to adopt the new BDA technology, complemented by skilled resources and business support.

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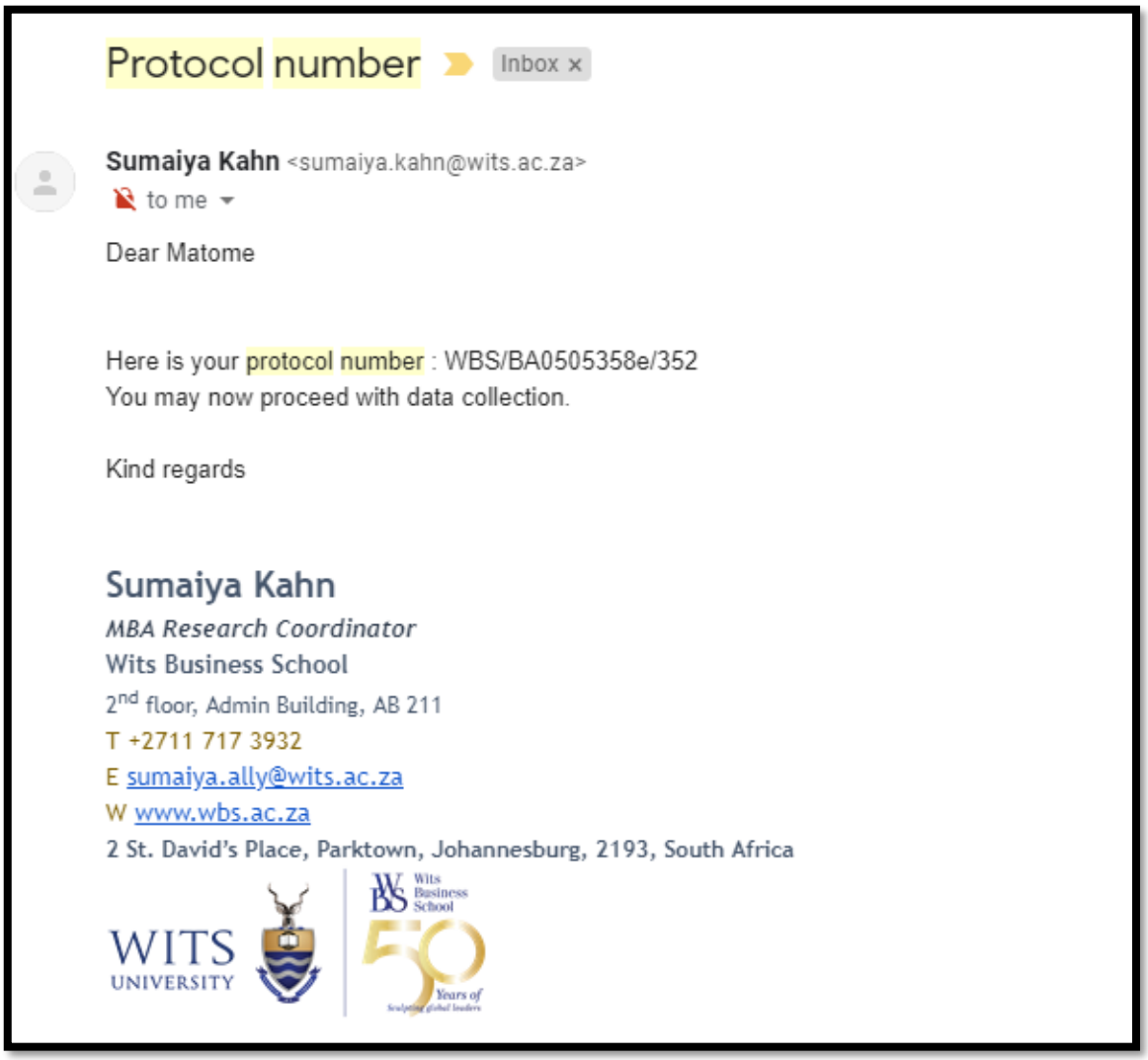
ANNEXURE A: Questionnaire

1. What comes to mind when I mention the words Big Data Analytics (BDA)?
    a. As in how to do you conceptualise or understand BDA?
2. In your own opinion, what are essential characteristics of BDA?
3. Do you think it is a worth adopting and implementing BDA?
    a. What would, as for now, recommend your organisation to go by: BDA or the traditional approach? And Why?
4. What are the advantages, if any, of BDA over the traditional approach in the financial service sector like your organisation?
5. In your own view do you think that adopting and implementing BDA in your organisation would impact positively on the company's productivity, performance, profitability and efficiency?
    a. As in would BDA improve the company's competitive/comparative edge?
6. As of now have you already embraced BDA in organisation? If so, how far have you embraced it? Are you happy with the state and progress it is at now? If happy, why so, if not happy why not?
7. What are the challenges are you encountering in the process of implementing it? How are you mitigating them?
8. If you have not yet embraced or adopted the BDA can you please tell me why we haven't done that?
9. Why are we taking long to adopt and implement BDA? I mean what are the contributing factors that could appropriately account for this delay?
10. What possible challenges would you think we may encounter if we decide to venture into adopting and implementing BDA in your organisation?
    a. How are you planning to mitigate them?
11. Do you think the benefits of adopting and implementing BDA in your organisation would outweigh the benefits of using the traditional approach? Why do you think so and not the other way round?
12. What measures or strategies would you recommend for your organisation to adopt in order to minimise the impact of the challenges we may encounter when we decide to adopt and implement BDA? Do you think these measures are practical and attainable?

ANNEXURE B: Ethical Clearance



Protocol number Inbox ×

Sumaiya Kahn <sumaiya.kahn@wits.ac.za>
to me

Dear Matome

Here is your protocol number : WBS/BA0505358e/352
You may now proceed with data collection.

Kind regards

Sumaiya Kahn
MBA Research Coordinator
Wits Business School
2nd floor, Admin Building, AB 211
T +2711 717 3932
E sumaiya.ally@wits.ac.za
W www.wbs.ac.za
2 St. David's Place, Parktown, Johannesburg, 2193, South Africa

WITS UNIVERSITY

Wits Business School 50 Years of

ANNEXURE C: Participants Letter

The Graduate School of Business Administration
University of the Witwatersrand, Johannesburg
2 St David's Place, Parktown, Johannesburg, 2193, South Africa
PO Box 98, WITS, 2050

To Whom It May Concern: 3/14/20

SURVEY / INTERVIEW PARTICIPANT INTRODUCTION

Opportunities for implementing Big Data Analytics in a financial services group

This is to confirm that Mr Matome Masiela is undertaking a bona fide academic project in partial fulfilment of the requirements of the Master of Business Administration (MBA) degree at the Graduate School of Business Administration, University of the Witwatersrand, Johannesburg (Wits Business School), provided the student can produce a valid student card that confirms his/her currer registration.

Wits Business School MBA students are required to carry out an Applied Research Project on a topic of their choice, which typically requires data collection and analysis grounded in academic literature. The final project report will be available to other scholars through the University library.

The project has been approved by the Wits Business School Postgraduate Committee and has been granted ethical clearance.

Your participation in this project is entirely voluntary, and if you choose to participate it is expected to take approximately 20 minutes. You are free to withdraw from the project at any time.

Please note that all responses will remain confidential and will only be used for the purposes of this project.

Should you have any questions regarding the project please contact the student, the project supervisor or the undersigned:

Student:
Matome Masiela
☎: 0115293447
: 0718985633
: matomemas@gmail.com

Project Supervisor:
Mr Munday
☎:
: 0828502588
: mundy.mike@gmail.com

Yours sincerely.

ANNEXURE D: Company Letter

The Graduate School of Business Administration
University of the Witwatersrand, Johannesburg
2 St David's Place, Parktown, Johannesburg, 2193, South Africa
PO Box 98, WITS, 2050

To Whom It May Concern: 3/14/2019

CONFIDENTIAL DISCLOSURE UNDERTAKING

Opportunities for implementing Big Data Analytics in a financial services group

This is to confirm that Mr Matome Masiela is undertaking a bona fide academic project in partial fulfilment of the requirements of the Master of Business Administration (MBA) degree at the Graduate School of Business Administration, University of the Witwatersrand, Johannesburg (Wits Business School), provided the student can produce a valid student card that confirms his/her current registration.

Wits Business School MBA students are required to carry out an Applied Research Project on a topic of their choice, which typically requires data collection and analysis grounded in academic literature. The final project report will be available to other scholars through the University library.

We would appreciate any assistance that you may be willing to give to our students in collecting data and preparing their final report. The data itself will remain confidential, the source of the data will not be disclosed and results will only be presented in a summarised format.

Should you have any questions regarding the project please contact the student, the project supervisor or the undersigned:

Student:
Matome Masiela
☎: 0115293447
: 0718985633
✉: matomemas@gmail.com

Project Supervisor:
Mr Munday
☎:
: 0828502588
✉: mundy.mike@gmail.com

Yours sincerely.

Prof Anthony Stacey
Director: Postgraduate Student Research
☎: +27 11 717 3587
: +27 82 880 4531
✉: Anthony.Stacey@wits.ac.za

Mr Matome Masiela