The perceived value of data analytics in the South African banking sector

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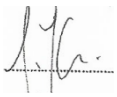
DECLARATION

I, Thembela Khedama, declare that this research article 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.

Thembela Khedama, 

Signed at Fourways, Sandton, Johannesburg

On the 27th day of February 2023

DEDICATION

This research is dedicated to:

- My wife Lethokuhle Khedama, for unwavering support and courage you have given me to complete this chapter of my life

- My parents, Nomtandazo Khedama and Liyanda Khedama, you have made countless sacrifices and never gave up on me through it all, I am eternally grateful

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To my supervisor Dr Bongani Munkuli, I am so glad to have you as my supervisor, your guidance has made this possible and I am forever grateful.

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ABSTRACT

Big data analytics is a technological process that covers the processing, arranging, categorization, and analysing of large voluminous data for purposeful usage by organizations. Big data analytics has in recent times become a buzz word as it proliferates exponentially within the banking sector in South Africa due to the maturity of storage, information technology and human skills within the domain of data. Despite this, there is little literature on big data analytics within the South African banking industry. It is evident that there is utilization of big data analytics tools and processes in the banking sector, but one question remains, is there value in South African banks derive from integrating big data analytics.

The objective of this study is to understand the perception on the value of big data analytics held by South African banking senior management and executives. The researcher aims to understand if big data analytics is a mere tool to perform basic analysis with little to no power to add value in business outcomes. The perception of seeing BDA as an analysis tool has led to the undervaluing of big data analytics within the South African banking industry as there are no group executive seats with data or analytics titles. To achieve the intended research outcome of this study this research adopts the qualitative approach method. The data is collected through unstructured interviews across four major banks in South Africa. A purposive sampling strategy was employed in selecting the respondents. Data analysis is conducted through thematic analysis.

This study found three global themes banking executives perceived to be valuable from adopting big data analytics. These were: (1) The state of big data analytics in banking, (2) Data Skills, (3) Driver of insights. The sub themes from the state of big data analytics in banking were: (1) Processing of the right data, (2) High volumes of data in the repository, (3) advanced analytics and the right tools to analyse data. The sub themes from data skills were: (1) resources, (2) technical skills. Lastly, the sub themes from the driver of insights were: (1) organization's performance, (2) competitiveness in banking, (3) fighting fraud and financial crime.

Keywords: big data, customer experience, analytics, IT capability.

Chapter 1: Introduction to the research

This paper investigates the perceived value-based adoption of Big Data Analytics, hence forth referred to as BDA, for South African banks. This introductory chapter begins by introducing the context of the research by detailing the relevant background, defining the key concepts tackled in the study. Following this foundation is the outlining of the problem statement, research purpose, and the research questions. The paper then presents the delimitations and significance of the undertaken study, concluding the section with an outline of the paper.

1.1 Context and background to the study

One of the critical components in business decision making is the availability of data, as it feeds the involved parties with the realities of the business operations and current market, allowing them to better assess where the organisation is and to better deduce what needs to be implemented to get it to where it needs to be (Gupta & George, 2016).

As a result, Big Data Analytics, BDA, has become a common business feature globally, with more and more organisations opting to adopt the technology in everyday business operations. It has now been widely accepted as a value adding information technology tool in various industries, with the capacity to elevate business performance through the enhancement of product development and service delivery (Kwon, Lee, & Shin, 2014; Dremel, Schlauderer, & Wulf, 2017). This paper aims to thus explore the perceived value of BDA in the South African banking industry, assessing the extent to which this technology has been adopted and accepted as a prolific business tool According to Gandomi and Haider

(2015), data is best valuable when it has been processed to present meaningful findings, as raw data often fails to provide insights that can be applied to real business scenarios. The processing of data then allows those raw findings to be transformed from syllables to impactful business assets that can be utilised to move the organisation forward (Gandomi & Haider, 2015). BDA has been therefore found to present these advantages for organisations: decision support capabilities, predictive capabilities, and traceability functions (Wang, Kung, & Byrd, 2018).

Additionally, it is also essential for organisations to embrace BDA as not only a product creation enhancement tool, but as a function that can also improve their competitive advantage. This advantage is not only limited to a particular industry or economy, as it has been seen in various industries and from emerging to developed markets (Kamioka, Luo, & Tapanainen, 2016). According to Tsai, Lai, Chao, and Vasilakos (2015), data analytics begins with the gathering of data, then follows the converting of the data into information, then lastly, the conversion of this information into insightful knowledge that can be used by the owning party. This paper aims to assess the implications thereof, of data extraction and processing, from an executive manager's point of view, understanding the relevant data strategies at that level of decision making.

1.2 Research conceptualisation

1.2.1 Problem statement

There has been evidence that has been presented that while BDA is vastly spoken about, there remains limited understanding on the full scope of its inherent value to organisations

(Mikalef, Boura, Lekakos, & Krogstie, 2019). Within the banking industry, BDA has mostly been perceived as a basic means to analysis, with limited power to directly create value and impact banking customers (Rishabh, Lekhrajani, & Rajpopat, 2017). This lack of understanding has led to the under-valuation of BDA, which has limited its ability to create real and lasting business value within the industry. With the rest of the industry markets adopting this technology at speedily rates, the banking industry remaining unclear on all the business benefits that could be derived in this respect poses a threat to the organisations functioning in this field, as this limits their ability to best serve the current needs of their customers in this quickly evolving society.

1.2.2 Research purpose

As the banking industry has been found to understate the potential contribution of Big Data Analytics to product development and enhanced customer experience, the objective of this study is to understand the perception on the full value of BDA held by South African banking executives.

1.2.3 Research questions

1. How do bank executives in South African perceive the potential value from adopting BDA?
2. What innovative developments do bank executives perceive from integrating BDA?
3. What customer experience do bank executives perceive by integrating BDA?

1.3 Delimitations

The main delimitation of this study is that it is only focused on the executive managers' perception of the adoption of BDA and does not extend to the full analysis of other members of the banking institution. Targeted executive managers are product owners, business managers, and general management. The other limitation of this study is that it condensed to the four big local banks in South Africa, excluding all other recognised financial institutions that serve the same purpose.

1.4 Significance of the research

The implications of this study will be to both the South African banking sector and the academic researchers within the Big Data field. Executive managers within the industry will gain insights on the value their peers have placed on BDA, from an enhancement of product development and customer experience point of view. This paper will also assist these decision makers to better align their perception with the true inherent value of the technology, ensuring that their understanding of its benefits is current and complete. Likewise, academic researchers in the field of Big Data will gain a South African banking context of the field and its literature.

1.5 Research outline

This report has five chapters, the first being this introductory chapter. This will be followed by chapter two, which evaluates theories, past research, and management studies relevant to this research. Chapter three focuses on the research design, research strategy

and the research methods to be employed in this study. Chapter four will uncover the findings of this study and discuss in detail the implications thereof. Chapter five is the summary and conclusion of this study.

Chapter 2: Literature Review

2.1 Introduction

Utilising existing literature is a standard practice in current academic research, as it builds the researcher's own understanding of the phenomena under study and guides the direction of the research according to what would be most beneficial to the field of study (Hannah, 2019). This section will be outlined as follows: a look into the current literature body covering the elements covered in the research questions, an analysis of the current knowledge gap pertaining to the perceived value of the adoption of BDA in the banking industry, and lastly, this section will also cover the development of the conceptual framework that will be adopted to address the research questions.

2.2 Research problem concepts

2.2.1 Big Data Analytics (BDA)

The definition of Big Data Analytics has evolved over the years (Gartner, 2022), the most common being the "…high-volume, high-velocity and/or high-variety information assets that demand cost-effective, innovative forms of information processing that enable

enhanced insight, decision making, and process automation" (Wamba, et al., 2017, p.2). In more recent years, BDA has been defined to be broad and inclusive management, processing, and analysis of volume, variety, velocity, veracity, and value (Wamba, et al., 2017). Organisations have used BDA to develop the capabilities of processing large amount of unstructured data to give them a competitive advantage in decision making (Pillay, 2015). This technology offers the capacity to handle and process large volume data, enables speed on diverse data points and effectively generates value.

Ciampi, Demi, Magrini, Marzi, and Papa (2021) have recently posited that BDA is "the next frontier for innovation, competition and productivity" (Manyika, et al., 2011, p.1). This technology allows businesses to strengthen their value proposition, which also positively impacts their innovation capabilities – this has been indicated by studies that have recently investigated the indirect and sometimes hidden benefits of BDA (Mikalef, Boura, Lekakos, & Krogstie, 2019). It has also been said that this impact on innovation by BDA is mostly driven by entrepreneurial orientations (Magrini, Ciampi, Demi, Marzi, & Papa, 2021). The expansion of this technology across various industries at a high speed has also increased the interest of scholars, who have also started investigating the influence BDA has on an organisation's competitive advantages (Mikalef, Boura, Lekakos, & Krogstie, 2019).

Big data analytics is a tool that companies utilize to improve their operational and financial performance through an extensive understanding of data. These companies formulate strategies based on the information they have and use big data analytics to convert the strategies into actionable insights (Gupta, Drave, Dwivedi, Baabdullah, & Ismagilova, 2020). According to (Tsai, Lai, Chao, & Vasilakos, 2015) data analytics follows a systematic flow of gathering data, converting the data into information, and converting it

into insightful knowledge for consumption and execution. This systematic process is premised in knowledge discovery in databases (KDD) which is defined as a process that enables the use and evolution of technical ways of extracting value from data. KDD transforms data into valuable knowledge that can be applied as solution to various problems (Fayyad, Piatetsky-Shapiro, & Smyth, 1996).

Organizations derive value from adopting big data analytics in the form of top management support, human resource expertise, business and information technology alignment, and understanding the organizational size and structures (Walker & Brown, 2019). Big data analytics enriches innovation pipeline of organizations by influencing strategies, logic and objectives, thus creating value for the organization and its stakeholder (Ciampi, Demi, Magrini, Marzi, & Papa, 2021).

2.2.2 Big data analytics in banking

Banks in the 21st century banks have positively adopted the use of BDA, mainly because of the scale of the data volume they store and utilise – some of it even dating back decades. This technology has enabled banks to minimise exposure to fraud and other associated risks, whilst also allowing them to redesign their internal structures through the understanding of their customers' behaviour and mapping out of current customer needs (Gopalkrishnan & Srivastava, 2015). Nevertheless, there is still a vacuum of understanding within the industry regarding the full business value that stands to be derived from the adoption of such a technology, as empirical studies on the value of BDA value are still at early stages (Mikalef, Boura, Lekakos, & Krogstie, 2019).

While there remains gaps in their full understanding of the value-add of such an adoption, most banks have a working appreciation for the standard gains of BDA. This appreciation has led them to invest more on the research and development of the technological infrastructure that can manage BDA. This will better enable them to reap of the rewards in risk management, marketing and sales automation, customer profitability, performance analytics, budgeting, product innovation, historical analysis, executive dashboards, regulatory compliance (Rishabh, Lekhrajani, & Rajpopat, 2017). Many organisations in the past have made the mistake of presumptuously making a substantial data acquisition without the ensuring the necessary technology and human intelligence to harness the value hidden in that data (Gupta, Drave, Dwivedi, Baabdullah, & Ismagilova, 2020). This mistake has in the past, led to the under-utilisation of this data due to the lack of technological infrastructure to handle BDA. A study by Dubey, et al. (2019) has shown that organisations have suffered from stunted growth due to the lack of the efficient use of technology and not having the adequate human interventions in place.

A global trend on banks utilizing big data to solve different problems from compliance, risk, customer understanding, product selling, fraud and financial crimes has been visible in the financial industry (Gopalkrishnan & Srivastava, 2015). With the proliferation of data and scaling up of big data analytics there is an opportunity to contribute to the body of knowledge of big data analytics in banking.

2.2.3 Perceived Strategic Value

A study by Verma and Bhattacharyya (2017) has revealed that the major reason some organisations have not adopted BDA is because of the gap in full understanding regarding

the strategic value to be derived from this technology. Internal inadequate change management systems have also resulted in resistance towards the seamless adoption of this technology. The researchers also presented that those organisations who did manage to successfully onboard the technology managed to extract and demonstrate the benefits associated with such an investment – particularly in their financial growth and in the customer experience facet of their business

Customer experience, (CX), is defined as the way customers engage and interact with an organisation at different stages of the purchase, service, or consumption value chain – all done through different touchpoints and mediums at different time horizons (Holmlunda, et al., 2020; Kranzbühler, Morgan, & Kleijnen, 2018). Over the years, CX has become the backbone for many organisations' competitive differentiation, and as a matter of related interest, BDA has been shown to have the potential to improve CX by the extraction of valuable customer insights from large data sets (Holmlunda, et al., 2020). The business issue for many organisations has gone beyond the need for data extraction, but more towards the analysis and understanding of said data to be able to implement relevant strategies that will move the business (Said, Macdonald, Wilson, & Marco, 2015).

While it has been posited that BDA has the potential to create opportunities for improved customer experience programs within an organisation, researchers Beath, Becerra-Fernandez, Ross, and Short (2012) have argued that this can only be achieved through multidisciplinary collaboration between IT and the related business functions. BDA contributes to the business' ability to effectively market products to specific customer profiles, affects internal and external market strategies, increases operational efficiencies and as a result, has positive net effects on the organisation's revenue (Rishabh, Lekhrajani,

& Rajpopat, 2017). Extracting this degree of value then warrants that organisation move from the mere use of human processing to make sense of customer data, but that there be a deployment of customer analytics (Kayande, De Bruyn, & Rangaswamy, 2009). A study by Germann, Lilien, Fiedler, and Kraus (2014) examined the benefits of the deployment of customer analytics and uncovered that the banking and securities industries were among those who perceived the effectiveness of customer analytics the most – as shown in Figure 1.

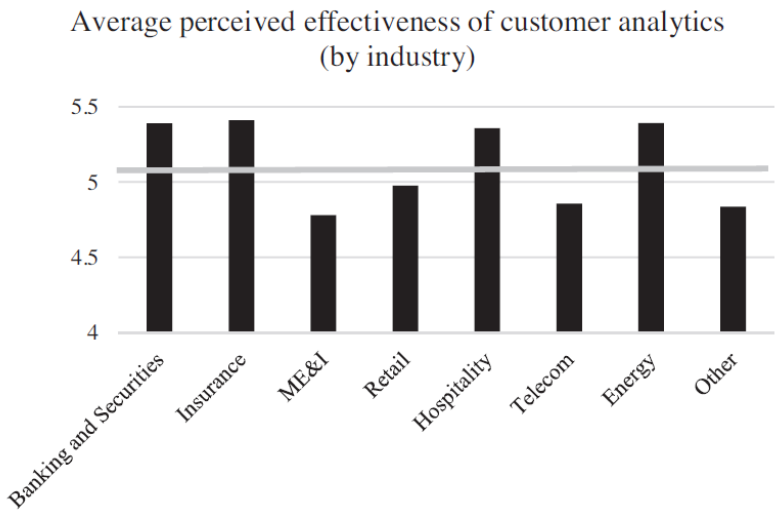


Figure 1: Average perceived effectiveness of customer analytics by industry (Germann, Lilien, Fiedler, & Kraus, 2014)

Additionally, a research study on the effects of DA on business performance conducted by Vitari and Raguseo (2019) offers empirical results that present those businesses who converted BDA insights into value adding actions measured an improved financial performance both in the market and grew their customer satisfaction. This and the growing

need for adequate customer analytics has seen the increase in DA in recent years, with organisations both in the public and private sector registering interest (Amankwah-Amoah, 2016).

2.3 Theoretical Framework

2.3.1 Big data predictive analysis (BDPA)

Big Data Predictive Analysis (BDPA) encompasses the different efficient ways of processing high volumes of big data into formats that will allow the organisation to draw business conclusions (Gupta, Drave, Dwivedi, Baabdullah, & Ismagilova, 2020). This process does include human intervention within specific loops for the sake of the management of the predictive analytics spectrum, however, these skills are highly specialised and remain organisation specific (Chen, Chiang, & Storey, 2012; Gupta, Drave, Dwivedi, Baabdullah, & Ismagilova, 2020).

Related, the dynamic capability view details how organisations can remain competitive in a dynamic environment (Ambrosini & Bowman, 2009). This view enables organisations to determine how to best use BDA for their internal needs and to best align their business strategies to the needs of the market they serve (Chen, Preston, & Swink, 2015). The use of such a view extends from the understanding that BDA can be a useful tool for identifying opportunities, investigating big data assets, and configuring insights that can benefit the organisation at both a strategic and operational level (Ciampi, Demi, Magrini, Marzi, & Papa, 2021).

As has been stated, the understanding of data can present an organisation with a great competitive advantage, but this understanding often does not only require technology, but human technical skill within the organisation. This is mainly due to the high voluminous, velocity and complexity of the data in question (Duan & Xiong, 2015). It has been further argued by Gupta, Drave, Dwivedi, Baabdullah, and Ismagilova (2020) that high tech organisations with a high operational dependency on technology can create a competitive advantage through their mastering the process of data analytics.

BDPA addresses research question 1 which seeks to understand the perceived value of BDA. BDPA points that a firm realises BDA value when data has been analysed to allow executives managers to make data driven decisions. BDPA as a capability will support the value executive managers seeks through insights from big data that will give them competitive advantage. This in line with the empirical findings on Gupta, Drave, Dwivedi, Baabdullah, & Ismagilova, (2020) that a firm's performance has a positive relationship with managerial skills which are two important component of big data predictive analysis (BDPA).

2.3.2 Big data analytics capabilities: dynamic vs adaptive

As mentioned on the section above, the dynamic capability presents an organisation's ability to adapt to business changes. For this to be a reality, the organisation needs to have an established body of skills and knowledge within itself to adapt from old resources and systems to a new way of creating value (Erevelles, Fukawa, & Swayne, 2016). According to Schilke (2014), this dynamic capability can be found in two environments: the first environment being characterised by less changes where the players of that market have the

capacity to foresee any incoming changes, and where the second environment is highly dynamic and characterised by frequent changes. Researchers Drnevich and Kriauciunas (2011) have argued that highly dynamic environments are needed for the realisation of significant value.

Scholars have previously varied on the effect of dynamic capabilities on an organisation's competitive advantage. For example, Griffith and Harvey (2006) argue that there is a direct link between an organisation's dynamic capabilities and its competitive advantage, pointing out that dynamic capability is the combination of rare resources to certify the organisation's competitive advantage. However, Helfat, et al. (2009) presented a different view, positing that dynamic capabilities do not necessarily result in competitive advantage, as a change may occur in the organisation's resource pool that may not actually bring any value in the short or long run.

On the other hand, adaptive capability presents an organisation's proactiveness in responding to market changes with the use of BDA and other minor data points from their customer analysis to conduct forecasts and other future trends analyses (Ma, Yao, & Xi, 2011). This capability is not the result of organisational structure changes but more so through the full use of BDA to gain customer understanding through normally omitted data points (Ma, Yao, & Xi, 2011). Organisations can create better value for their customers through the use of BDA to enhance their extraction and understanding of customer insights, allowing the organisation to achieve sustainable business results even in changing environments (Ambrosini & Bowman, 2009).

Dynamic and adaptive capability views will address the potential of new product developments within a firm as the environment changes. It forms the foundation of

adaptability a firm needs in their product proposition. Research question 2 will feed into this theory and address the perception of potential benefits from BDA integration in product development. In a study by (Wamba, et al., 2017) there is empirical evidence that the presence of big data analytics capability in a form of dynamic capability, firms can leverage big data analytics capability to remain competitive in a changing business environment. These findings pointed out that process oriented dynamic capability plays a mediating role, and in uncertain environments big data analytics capability can act as a form of sustainable competitive advantage (Wamba, et al., 2017).

2.3.3 Business model innovation

Baden-Fuller and Morgan, (2010, p.3) defined a business model to be a "*set of generic level descriptors of how a firm organises itself to create and distribute value in a profitable manner*'. A study by Clauss (2017) identifies three business model dimensions: value creation, value proposition, and value capture. Value creation deals with resource allocation and enablement initiated within the firm's process of producing customer related value (Achtenhagen, Melin, & Naldi, 2016). A view that is popular in the perception of value creation is that value is co-created between the service provider and the customer (Lusch & Vargo, 2014). Most services have this customer co-creation ability embedded in their business model, as most of their employees are trained and educated professionals with the best understanding of their customers' needs (Åkesson, 2016). Furthermore, they hold advanced understanding of customer support strategies best suited for the organisation and market, positioning them as those best placed to innovate customer centric products and services (Åkesson, 2016). The promotion of co-creation and customer centric solutions from frontline employees thus enhances customer experience through innovation.

As has been noted, big data inclusion in organisations enables innovation, unlocks competitive advantages, and fosters efficiency (Ciampi, Demi, Magrini, Marzi, & Papa, 2021). This understanding of customer behaviour unlocks the organisation's potential to create user centric opportunities (Trabucchi, Buganza, Dell'Era, & Pellizzoni, 2018). Business model innovation as a process interrogates the ways in which big data can disrupt an organisation's business logic (Bouwman, Nikou, Molina-Castillo, & de Reuver; Ciampi, Demi, Magrini, Marzi, & Papa, 2021). Furthermore, researchers Ciampi, Demi, Magrini, Marzi, and Papa (2021) argue that if an organisation has big data on its customers, competitors, and the market it operates in, with the ability to convert this data into knowledge, the organisation is better positioned to develop new products or enhance the existing ones for the sake of customer needs – which leads to improved profitability. Applying dynamic capability, which is the ability for firms to change, to business model innovation allows organisations to maintain sustainable profitability through their adapting to new markets while offering customer centric products and services (Heider, Gerken, van Dinther, & Hülsbeck, 2020).

2.4 Conclusion

The theoretical framework outlines three important theories within BDA that organisation ought to implement to realize the full value of this technology. These are: big data predictive analysis view, dynamic vs adaptive capability view, and the business innovation model. The literature outlines that the environment in which organisations trade in is ever changing, and to keep up with the changes, organisation need to constantly keep and update internal big data on their customers, competition and the business market at large. The important capability outlined by the literature is the ability to source data and transform it to

knowledge that can be applied to decision making and value generation within the organisation. Regarding an optimised customer experience, the literature outlines the business innovation model, wherein value perception is realised. The fusion of the dynamic capability view and business model innovation is an optimal combination that would create long term profitability for organisations through the constant innovation that would be aligned to current market conditions and customer needs.

The objective of the researcher is to investigate the perception of big data analytics within the banking industry in South Africa by attempting to answer the following research questions:

Research question 1: How do South African banking executives perceive the potential value to be derived from adopting BDA?

Research question 2: Do banking executives perceive any potential innovative developments benefit from the integrating of BDA?

Research question 3: Do banking executives perceive any potential customer experience benefit from the integrating of BDA?

Chapter 3: Data collection and analysis

This section presents the investigated research methods, outline the research strategy, design and approach that will be applied as a means of achieving the aim of this research study. The procedures and methods adopted in the collection, analysis, and processing of the

response from interviewees will also be outlined, concluding with the ethical considerations relevant to this study.

3.1 Research strategy

Common research approaches that are normally adopted by researchers include the quantitative, qualitative, and mixed methods approaches (Williams, 2007). The quantitative research strategy is generally adopted by researchers who have need to numerically quantify their findings, as it is highly centred on statistical analysis and deductions (Williams, 2007). On the other hand, the qualitative research approach involves a more natural set up that gives the researcher in-depth details on the phenomena under study, and often involves the inclusion of actual experiences (Creswell, 1994). Lastly, the mixed methods research approach is largely a combination of both the quantitative and qualitative strategies (Burke & Onwuegbuzie, 2004). It is often used by researchers who wish to combine the strengths of these two approaches to better improve the quality of their findings while eliminating some of the inherent weaknesses.

This research adopts the qualitative approach method, mainly due to the type of research questions and the level of in-depth assessment needed for the understanding of the perceptions behind BDA within the banking industry. In their paper, Bluhm, Harman, Lee, and Mitchell (2011) posited that the qualitative approach is beneficial when investigating phenomena that has not been well studied in the past, with the hopes of filling in knowledge gaps where relevant. This is because this approach allows the research to explore previously unvisited areas to uncover new information that could be of use to generations to come. Additionally, Pillay (2015) also adopted the qualitative research approach when

investigating BDA's contribution to combating fraud in the South African banking sector back in 2015, and as this research is studying a concept fairly similar, the same approach is justified. At that time, the researcher undertook this approach because the concepts of BDA and fraud were fairly new at that time, and they needed to lay foundations that were previously not available, needing to be more explorative in nature. The same is the case for the research in question. This approach allows the researcher to best understand the significance of the practical experiences as detailed by the interviewees, which aligns with the initial objective of the study – understanding the perceptions of BDA held by banking executives in the South African banking industry.

3.2 Research design

The research design provides the researcher with a method for data collection and analysis (Bryman, 2016). It is the architectural design or a blueprint of a research paper and the execution of the research process using methods and tools (Bailey & Mouton, 2005). Bryman (2012) lists five generic research designs, namely: cross-sectional, longitudinal, case study, comparative and experimental. The cross-sectional research design has attributes that allow for use under the quantitative research approach, with the exception of a few cases under qualitative – one such being the employment of unstructured interviews as the data collection instrument. As a result, the researcher adopts this design, and will utilise unstructured interviews to collect the data from respondents.

Similarly, researchers Walker and Brown (2019) utilised the same design for their study, where they investigated the adoption of BDA in the telecommunications industry in South

Africa. They too conducted unstructured interviews and listed a quick turn-around as one of the advantages of their choice.

3.3 Research target population and sampling

3.3.1 Research target population

In a study, the process of collecting data from all members of a population is called census (Draugalis & Plaza, 2009). This is very difficult to do when the size of the population is large and has given need to the smaller and more concise number, referred to as the sample, instead. The target population of this study can be narrowed down into these groups: the four biggest banks (by deposit) in South Africa, and the executive managers currently employed by those banks. While the sector has been characterised by large volumes of data, there still remains a gap in the appreciation of the value presented by the adoption of BDA within the sector. These four banks are responsible for over 83% of the market by deposit (Galal, 2020), and the relevant target personnel are listed in Table 1 below:

Table 1: Profile of stakeholders

Stakeholder	Area of expertise
Four largest South African banks by deposits	● Data and Analytics ● Product development ● Customer Experience

3.3.2 Sampling

The study adopts the qualitative research approach, which mainly focuses on discovery and the actual perceptions of the respondents, and much less the statistical generalisations of the data (Schultze & Avital, 2011). As has been stipulated in Chapter 2, to attempt to address the research questions, the study will focus attention on: big data analytics in banking, customer experience, product development, and innovation. Considering this, the researcher has source seasoned managers in these categories to share their perceptions and achieve the aim of the investigation. This type of respondent selection is known as purposive sampling. In this type, the researcher must outline the context which will address the research questions and then base the sampling technique in that context (Bryman, 2016). One of the advantages of this kind of sampling is that it ensures that the sample has the adequacy to address the needs of the research questions, thus achieving the aim of the study. Table 2 outlines the detail of the sample breakdown. The sample for a purposive sample, interviewees between six and ten can provide sufficient experience (Malterud, Siersma, & Guassora, 2016). Considering this, this study chose a sample of 12 participants for the purpose of equitable distribution across the 4 banks. However, this study reached a point of saturation at 11 interviewees because the response began to go on a loop and kept repeating.

Table 2: Profile of the interviewees

Bank	Area of Expertise	Sample
Bank 1	Chief Data & Analytics Officer	1
	Head: Product development	1
	Head: Customer experience	1
Bank 2	Head: Data & Analytics	1
	Head: Product economics	1
	Senior manager Customer experience	1
Bank 3	Senior manager of data and analytics	1
	Head of behavioural economics	1
	Head of product engineering	1

Bank 4	Head: Data & Analytics	1
	Executive: Product development	1
Total Sample		11

3.4 Data collection and research instrument(s)

This section outlines the methods and procedures adopted to collect and collate the empirical data, beginning with the data collection instrument, wherein the data collection process is outlined.

3.4.1 Research instrument(s)

The collection instrument employed for this research is the interview schedule. In the exploratory research phase flexibility offered by this instrument provides support to the researcher (Bryman, 2016). Interview structures are divided into three categories: unstructured, semi-structured, and fully structured (Yan & Wildemuth, 2009). This study has elected to employ the unstructured interview instrument. Unstructured interviews are part of the disciplines of anthropology and sociology, disciplines that were developed to elicit respondents' social reality (Yan & Wildemuth, 2009). In like manner, this research

aims to elicit the social realities of executive managers in the banking industry to determine their lived perceptions on BDA's value in their field. Some of the advantages of employing this instrument include: an allowance for interviews to be scheduled at short notice, flexible enough for the investigator to react and engage the responded on the spot, and the provision of the natural conversational style which eliminates restrictions on the respondents' side.

3.4.2 Data collection process

As has been stipulated, the researcher uses the unstructured interviews instrument to collect data from the selected respondents. The interview is at the convenience of the respondent and can take the form of face to face, an online or virtual interview. The data collected is available in transcription and in video or audio formats. It is stored in an encrypted location, and this has been outlined to the respondent, who has given his or her consent before the commencing of the interview. The time allocated to each interview is between 30 - 60 minutes. The benefit of collecting the data by use of audio recordings is that it allows the researcher to revisit the moment and capture the exact context and perception advanced by the respondent (Bryman, 2016). The study that used a similar research design is (Walker & Brown, 2019), this study was evaluating the adoption of big data in the telecommunications industry where factors influencing the adoption were identified.

3.5 Research Data Analysis

The data used in this study is interviews transcribed into audio files. This is the source data that is processed. The virtual platforms used as meeting places have an embedded technology that allows for transcription, e.g., Microsoft Teams has a function to transcribe

the conversation by the speakers, upon which, qualitative data thematic networks are utilised to perform thematic analysis (Attride-Stirling, 2001).

Thematic analysis performs clustering techniques on the text analysed and classifies the text into topics and classes for better presentation (Attride-Stirling, 2001). Additionally, this thematic analysis (see figure 2) creates a traceable network that details the steps involved when transitioning from text to interpretation (Pillay, 2015). The steps required to create a thematic network are as follows: begin by coding the material, move to then identifying the themes, then finally, conduct the thematic networks. This process will form the following networks: basic themes, organising themes, global themes (Attride-Stirling, 2001). The researcher then finalises this process by summarising networks and interpreting the findings.

Figure 2 below is a graphical representation of a thematic network.

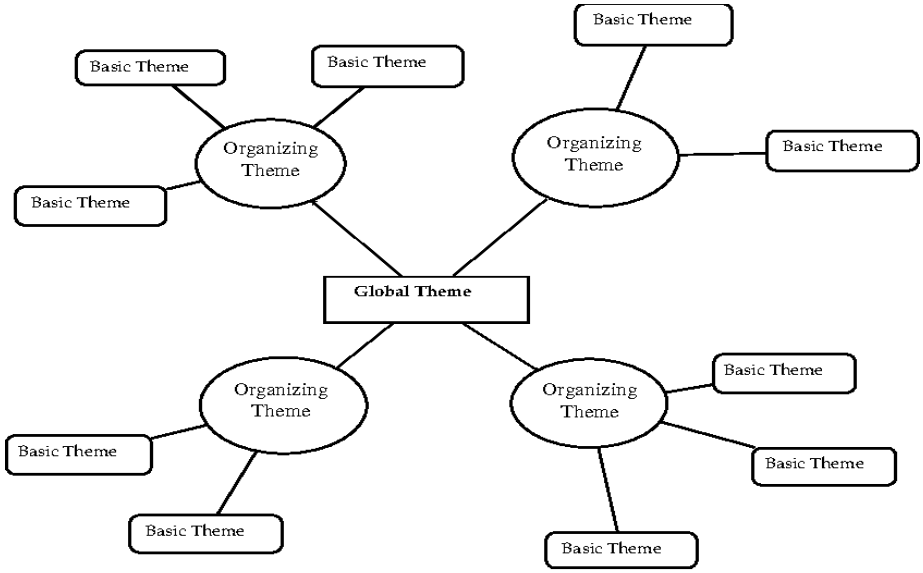


Figure 2: Thematic network structure

3.6 Strengths of the study

In a study by (Morse, Barrett, Mayan, Olson, & Spiers, 2002) it is pointed that to attain rigor in qualitative research, the researcher must exercise reliability and validity as fundamental concepts. Reliability and validity are translated to trustworthiness, reliability, transferability, and confirmability (Morse, Barrett, Mayan, Olson, & Spiers, 2002). In the same study it further outlines that research ought to be verifiable, and a process of verification includes checking, being sure, and confirmation.

Research external validity – transferability

Transferability is when research outputs can be applied in different social set ups (Bryman, 2016). The concept of BDA value perception will not only be limited to banking but across different sectors which may seek to understand the value derived from BDA.

Research internal validity - credibility

Credibility of the research is when the researcher investigates what the study requires them to investigate. Addressing the objectives and questions of the research from the respondents (Bryman, 2016). In this study recordings and transcriptions will be provided as proof and included in the analysis to ensure credibility. These recordings can be used in future to validate the research findings that have come out of this study.

Research reliability

Research reliability refers to a study being able to be consistent across different settings its replicated in (Bryman, 2016). If this study is applied to a different industry outside of

banking, there is high probability that its findings will be applicable due to the nature of unstructured interview approach with a purposive sampling. This study sourced its respondents based on their skills and areas of expertise from a professional social media page, the expertise of these professionals were validated by having a conversation with them in their organization's platforms, i.e. work emails and work communication platforms.

3.7 Limitations of the study

This study only depends on the interviewees to accomplish its objectives

To gain insights and foundation of this research, the exploratory nature means that it highly relies on feedback, and expert perceptions of the respondents

The four banks included cater leave out 15% of the deposit market, this study does not cover 100% of the deposit banking market

3.8 Ethical considerations

According to Guillemin and Gillam (2004), there are two dimensions to ethics: procedural and practical ethics. Procedural ethics are governed by an institution and its committees, these uphold procedures that deal with informed consent, confidentiality, rights to privacy, human rights, and protection from harm. Practical ethics, on the other hand, deal with ethics in practice, which covers field ethics. The ethical implications of this study are procedural, but the researcher aims to uphold both. The researcher will uphold high standard in ensuring the protection of the human rights of the interviewees and protect them from harm in this process. Furthermore, the researcher will cover informed consent, confidentiality and right

to privacy of the interviewees. In soliciting a response during the interview, the researcher will conduct themselves professionally and respect acceptance and rejection to the interview. Ahead of the interview, the researcher will communicate the research topic and context. Upon acceptance to participate, the researcher will share the consent form to the interview through email, and when the respondent accepts the interview, the interview will be conducted at the convenience of the respondent. The data collected will also be stored in an encrypted server in the form of an audio and transcription text.

Chapter 4: Presentation of the results

4.1 Introduction

To solicit the response from the interviewees unstructured interview was used, to analyse the responses thematic-network analyses was used to find patterns and themes emanating from the interviews. These themes were clustered across all responses and were grouped under each relevant research question. Due to triangulation strategy that was used in this study, the interviewees did not answer all questions only those relevant to them.

4.2 Presentation of results for Research Question 1

Research question number one was how do South African banking executives perceive the potential value to be derived from adopting BDA? All the interviewees were able to answer this question because they have in one way or the other have an opinion about the value that their business units derive from BDA. Therefore, for this question the responses are composed from 100% of the interview panel.

Table 3 shows the global and organising themes emanating from the interviewees for research question 1.

Table 3: Global and organising themes.

Global Themes	**Organising Themes**
The state of data analytics in banking	The availability of quantifiable data The processing of the right data High volumes of data in the repository Availability of data infrastructure and tools
Data skills	Technical skills Resources
Driver of insights	Customer understanding Financial performance Competitive in banking

The following section unpacks the basic themes from each of the three global themes.

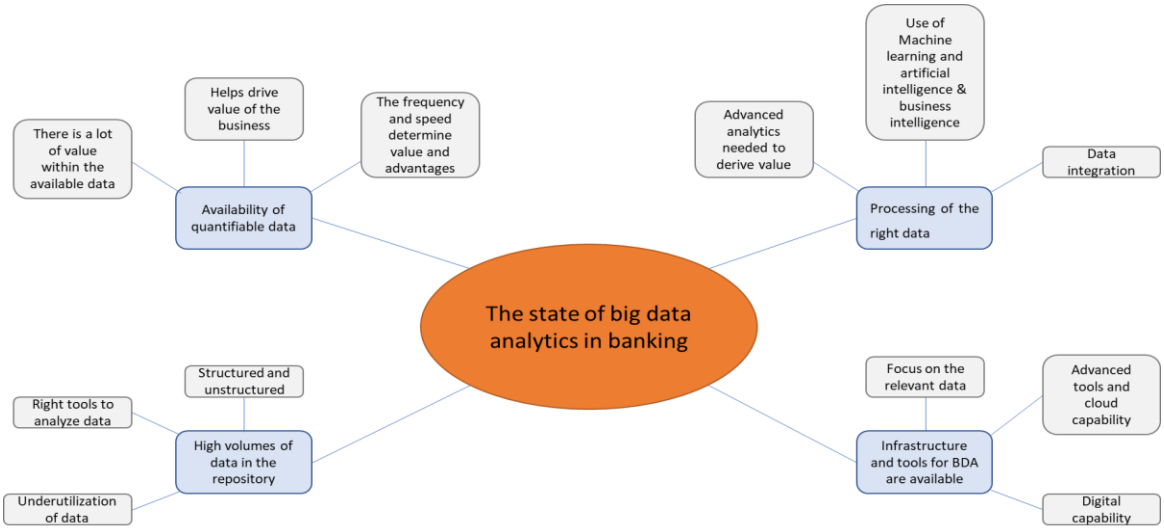
4.2.1 The state of big data analytics in banking

This section explores the state of big data analytics capability in the banking sector. The themes that were found are in table 4.

Table 4: Basic themes for the state for big data analytics in banking

Basic themes	**% Of mentions**
Value of data	100%
Speed, volume, and value	91%
Advanced analytics	91%
Machine learning, AI, and Business intelligence	73%
Focus on relevant data	91%
Right tools to analyse data	82%

Figure 3 below is a graphical representation of a thematic network for global theme 1: The need of BDA in banking



4.2.2 Data skills

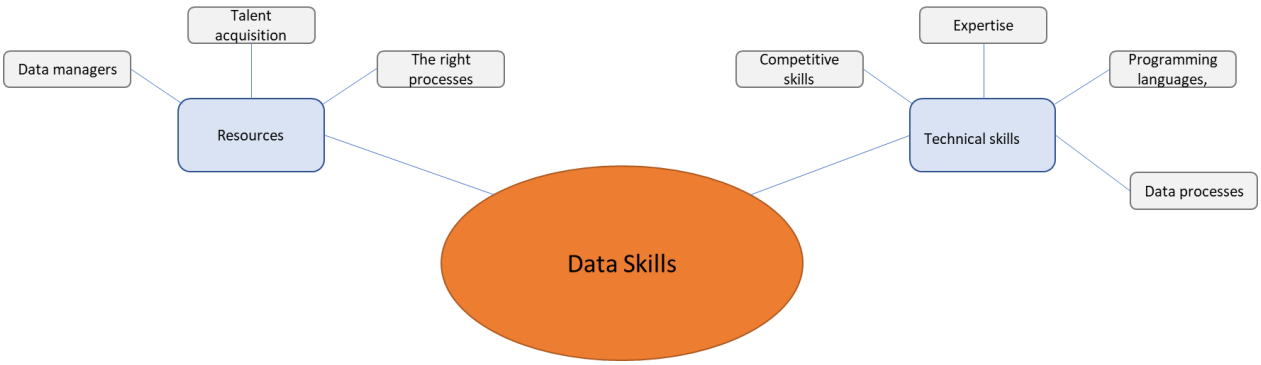
This section explores the data skills in the South African banking sector. The themes that were found are in table 5.

Table 5: Basic themes for data skills in the South African banking Sector

Basic themes	**% Of mentions**

Talent acquisition	73%
The right processes	55%
Competitive skills	82%
Programming languages	55%

Figure 4 below is a graphical representation of a thematic network for global theme 2: Data skills in the South African banking sector



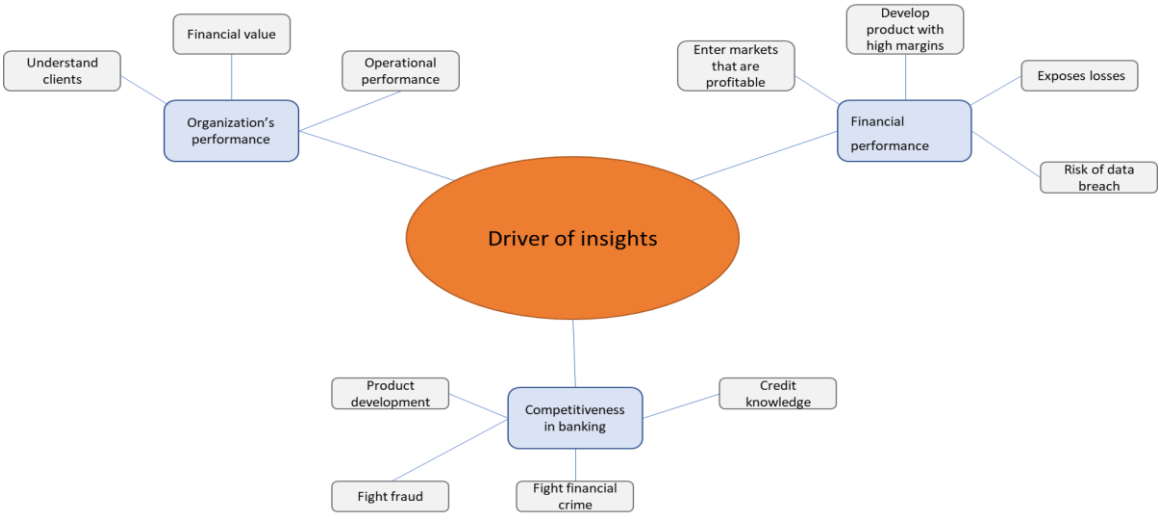
4.2.3 Driver of insights

This section explores BDA as the driver of insights in the South African banking sector. The themes that were found are in table 6.

Table 6: Basic themes for BDA as a driver of insights in the South African banking Sector

Basic themes	**% Of mentions**
Understand clients	100%
Operational & Financial performance	64%
Fight fraud	64%
Product development	91%

Figure 5 below is a graphical representation of a thematic network for global theme 3: BDA as a driver of insights in the South African banking sector



4.3 Results presentation for Research Question 2

Research question number two was if banking executives perceive any potential innovative developments benefit from the integrating of BDA? All interviewees did respond to the question. All the interviewees were able to answer this question because they have in one way or the other have an opinion about the value that their business units derive from BDA. Therefore, for this question the responses are composed from 100% of the interview panel.

Table 7 shows the global and organising themes emanating from the interviewees for research question 2.

Table 7: Global and organising themes.

Global Themes	**Organising Themes**

Banking products	Pricing advantages Investment products Credit products
Competitive advantages	Data modelling View a client from different angles Valuable information/Insights
Information Technology capability (IT capability)	Client financial dashboards Curated data views 3rd Part data

The following section unpacks the basic themes from each of the three global themes.

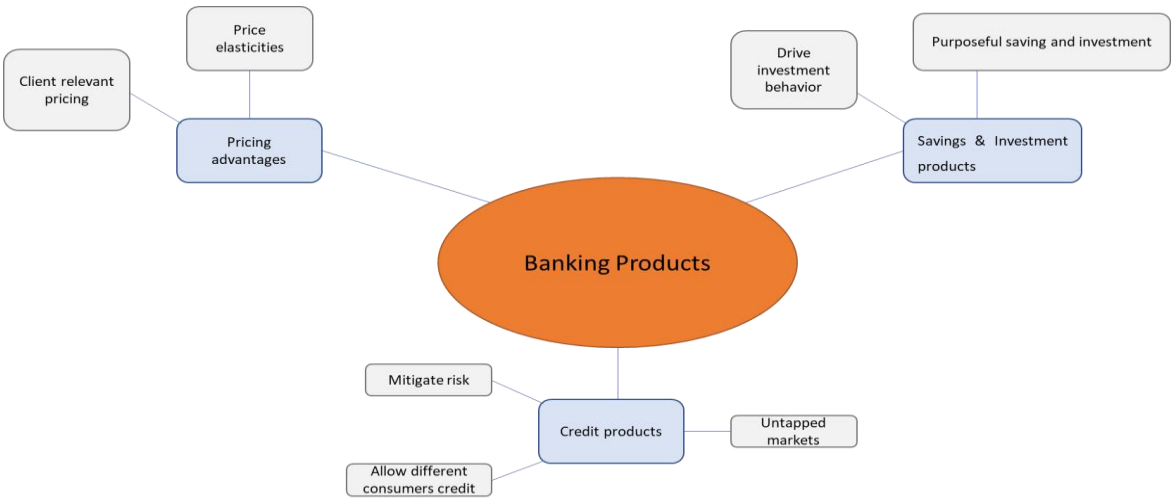
4.3.1 Banking products

This section explores the perception of big data analytics capability in the banking sector. The themes that were found are in table 8.

Table 8: Basic themes for banking products

Basic themes	% Of mentions
Client relevant pricing	82%
Purposeful savings and investment	45%
Untapped markets	55%
Different credit for consumers	64%

Figure 6 below is a graphical representation of a thematic network for global theme 4: Banking products



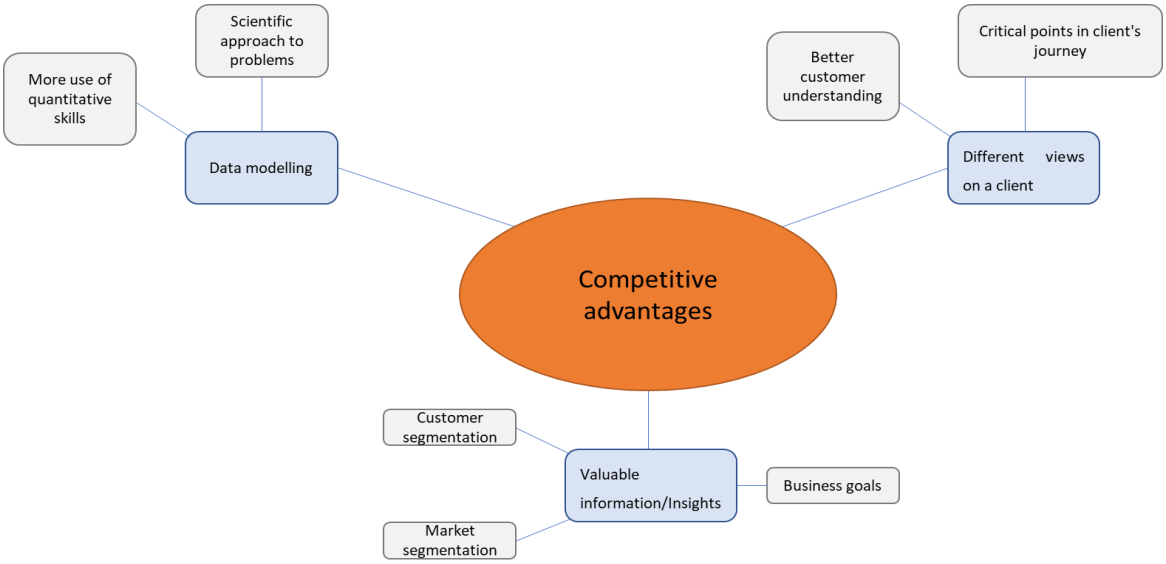
4.3.2 Competitive advantages

This section explores the perception on competitive advantages of BDA in the South African banking sector. The themes that were found are in table 9.

Table 9: Basic themes for competitive advantages

Basic themes	**% Of mentions**
Scientific approach	55%
Better customer understanding	91%
Business goals	73%
Customer segmentation	82%
Market segmentation	73%

Figure 7 below is a graphical representation of a thematic network for global theme 5: Competitive advantages



4.3.3 IT capability

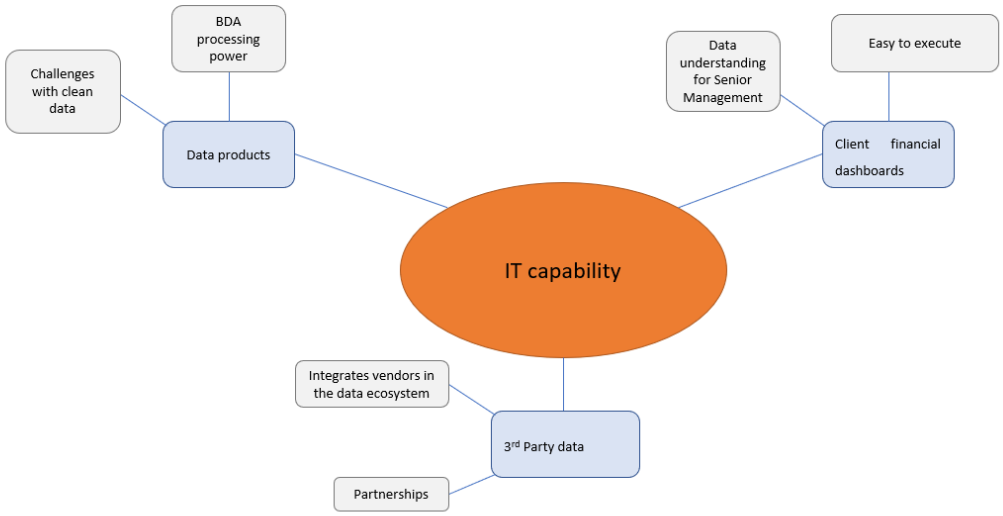
This section explores big data analytics' IT capability in banking. The themes that were found are in table 10.

Table 10: Basic themes for IT capability

Basic themes	**% Of mentions**
Challenges with clean data	64%
Data understanding for senior management	55%

Easy to execute Integrates vendors in data ecosystem	82% 36%

Figure 8 below is a graphical representation of a thematic network for global theme 6: IT Capability



4.4 Results presentation for Research Question 3

Research question number three is if banking executives perceive any potential customer experience benefit from the integrating of BDA? All interviewees did respond to the

question. All the interviewees were able to answer this question because they have in one way or the other have an opinion about the value that their business units derive from BDA. Therefore, for this question the responses are composed from 100% of the interview panel.

Table 11 shows the global and organising themes emanating from the interviewees for research question 3.

Table 11: Global and organising themes.

Global Themes	**Organising Themes**
Customer analytics	Customer journeys Present & Future view of customers Tailored customer solutions Relevant products
Speed and readiness of information	Research Dashboards Too much information
Product strategy	Customer needs

	Product development

The following section unpacks the basic themes from each of the three global themes.

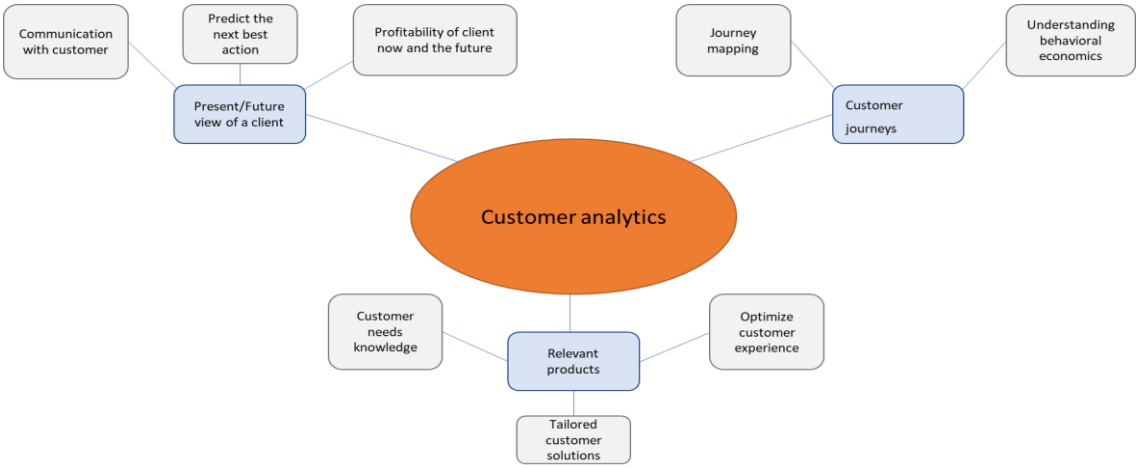
4.4.1 Customer analytics

This section explores customer experience through customer analytics as an organizing theme. The themes that were found are in table 12.

Table 12: Basic themes for customer analytics in banking

Basic themes	**% Of mentions**
Profitability of a client now & the future	73%
Communication with a customer	91%
Journey mapping	36%
Customer needs knowledge	100%
Tailored customer solutions	91%

Figure 9 below is a graphical representation of a thematic network for global theme 7: Customer analytics



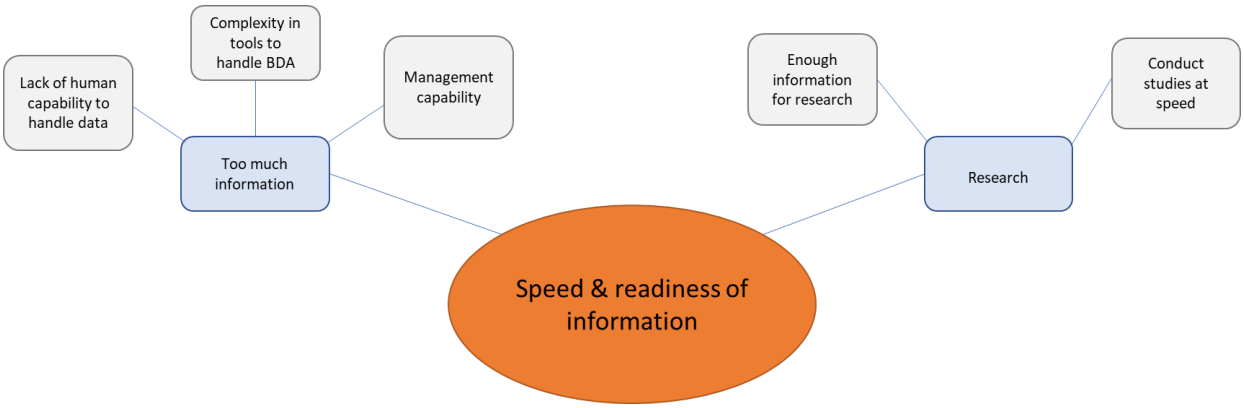
4.4.2 Customer experience analytics

This section explores the perception of customer experience under the organizing theme of Customer experience analytics. The themes that were found are in table 13.

Table 13: Basic themes for Customer experience analytics in the South African banking Sector

Top themes	% Of mentions
Enough information for research (Research)	36%
Lack of human capability to handle data (Too much information)	82%
Management capability (Too much information)	91%

Figure 10 below is a graphical representation of a thematic network for global theme 8: Speed and readiness of information



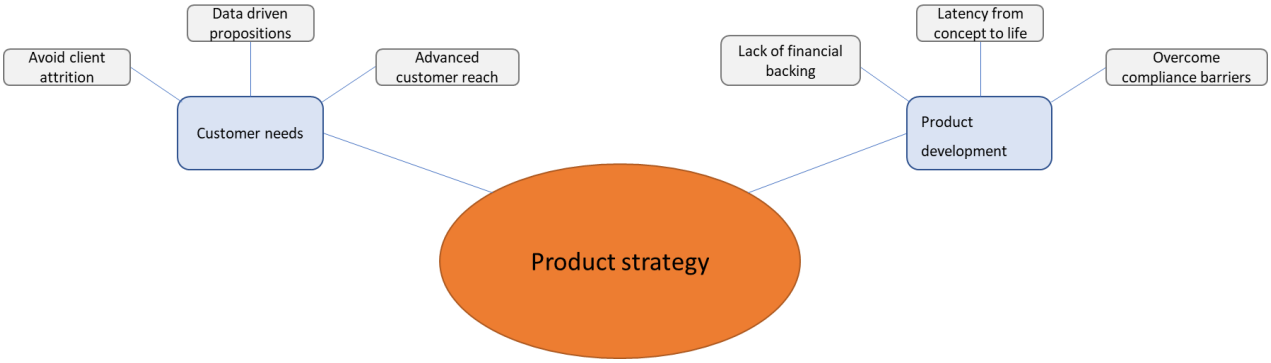
4.4.3 Product strategy

This section explores customer experience influenced by product strategy as an organizing theme. The themes that were found are in table 14.

Table 14: Basic themes for product strategy in the South African banking Sector

Basic themes	**% Of mentions**
Data driven propositions (Customer needs)	100%
Avoid client attrition (Customer needs)	55%
Lack of financial backing (Product development)	36%

Figure 11 below is a graphical representation of a thematic network for global theme 9: product strategy



4.5 Summary of the results

The purpose of this research was to understand the perception held by executive and senior management about the value of big data analytics in the banking sector. The researcher approached the interviewees based on their employment and function relevance within banking, using triangulation strategy to identify the interviewees and solicit their opinion in their functional work areas. 9 global themes were a result of the triangulation strategy, within these global themes there were 27 organising themes and 69 basic themes.

The following themes were the most prominent in Big Data Analytics and were mentioned by more than 70% of the interviewees:

- Value of data
- Speed, volume, and value
- Advanced analytics
- Machine learning, AI, and Business intelligence
- Focus on relevant data

- Right tools to analyse data
- Talent acquisition
- Competitive skills
- IT capability

The following themes were the most prominent in the value perception and were mentioned by more than 70% of the interviewees:

- Understand clients
- Product development
- Client relevant pricing
- Better customer understanding
- Business goals
- Customer segmentation
- Market segmentation
- Easy to execute
- Profitability of a client now & the future
- Communication with a customer
- Customer needs knowledge
- Tailored customer solutions
- Lack of human capability to handle data
- Management capability
- Data driven propositions

The results presented in this chapter are discussed in the next chapter.

Chapter 5: Discussion of the results

5.1 Introduction

This chapter will discuss and expand on the results presented in Chapter 4. The demographics of the participants were not material and did not form part of the scope of the investigations or findings for this paper. The results are discussed in the same format of the presentation of the results, i.e., in research questions.

5.2 How do bank executives in South African perceive the potential value from adopting BDA?

The first research question aimed to uncover how South African banking executives perceive the potential of the value that can be derived from the adoption of BDA. To answer this question, the interviewees discussed three global themes: the state of BDA in banking, data skills, and the driver of insights. Understanding the contributors of the business value of BDA will add to the body of knowledge available on the subject, helping many more in the future.

5.2.1 The state of big data analytics in banking

a) Processing of the right data

Interviewees believed that BDA has value in the banking sector in that it is generated and stored as millions of data points collected by the organisation every hour. All

this data has extractable value to the organisation, stored in reservoirs and data lakes like data repositories. This data can then be processed by use of programs like HIVE, Python, Hadoop, AWS, and Microsoft Azure, bringing analysis that can be converted from information to applicable business strategies to drive the business forward. They further mentioned that there is value in big data and when used correctly, BDA can be the success driver of the organisation, one interviewee remarks that "…if you look at everything we do or create as a business, data is at the centre of that creation…". This is in line with the findings of Gupta et. al (2020), who mention that information is an important resource that contributes to the success of the business. The researchers posit that when using the right tools and techniques, an organisation can sort, classify, arrange, and analyse its data through Big Data Predictive Analytics (BDPA) to enhance the value of insights and to drive better business decisions and direction. It emerged through the discussion that the use of machine learning, artificial intelligence and business intelligence is a gateway to the sorting, processing, and analysis of the data for business consumption.

b) High volumes of data in the repository

The interviewees agreed that due to the voluminous nature and the speed with which the data flows through an organisation, the right tools are needed for the storage and categorisation of the relevant data. Mention was made by respondents of tools like PowerBI, SQL servers, SAS (Statistical Analysis Systems), MS Azure, Amazon Web Services and its analytical offerings, python, HIVE and Hadoop. A respondent comments *"my team uses a lot of python, HIVE and Hadoop… we use AWS and Azure here and there*". As they already make use of these tools, the banks are said

to have the right capability for BDPA.) BPDA is a technique that enables organisations to process and untangle the information hidden in voluminous data for decision making (Duan & Xiong, 2015).

c) Advanced analytics and right tools to analyse data

In the discussion with interviewees, it emerged that the capability for advanced analytics is a sign of data maturity for a bank. Tools like PowerBi, SQL, Python, Hadoop, programming languages, AWS (Amazon Web Services), and Microsoft Azure. The view that BDPA also B integrates strategic resources is also outlined by Wamba, et al. (2017), with Dwivedi et. al (2017) also positing that innovation within organisations is achieved through the right high-tech tools.

5.2.2 Data skills

a) Resources

The interviewees discussed talent acquisition as a strong resource that banks need in order to harness the value of data skills. There are designated recruitment teams within the banks that specialise in sourcing the right data skills for the organisations. These teams responsible for the recruiting also has basic and fundamental understanding of data and analytics, therefore they have an appreciation for the kind of calibre needed in this discipline. An interviewee comments with "*HR is very good, and they know the technical required skills from candidates…*". These efforts are in line with the recommendations of Ayyagari, Grover, and Purvis (2011), who also present that there should be an alignment and fit between the job designation and the

chosen employee's competence. If this congruence exists between employee fit and job requirements, then the employee's performance is bound to be optimal, and by extension, the business requirements will be met. While noting that they indeed did look for the right kind of specialised skills for the roles, the sourcing respondents in the study did note that there were often difficulties in sourcing the right people for the team, noting that a considerable volume of candidates leave after only a short tenure. One of the interviewees noted that "*... data scientists do not stay for more than 3 years in a role at [BANK 1] ...*"

b) Technical skills

Interviewees noted that data skills are technical skills that are required for the sake of big data analytics. The respondents discussed that if there is a lack of quality and competitive skills, the outcome of the analysis will be poor and will not give the management adequate insights to make decisions from. One of the interviewees noted, *"it's very difficult to find the right people with quality skills sometimes, and we make the wrong hire"*. This is in line with findings from Gebauer and Shaw (2002), who found that placing the right and qualified candidate in the analytical roles yields positive outcomes for the organisation in the long run.

5.2.3 Driver of insights

a) Organization's performance

There was a full census in all the interviews that the value to be derived from BDA is seen and measured through organisation's performance. The interviewed panel mentioned understanding clients' needs being at the centre of creating said value,

which will in turn create channels of servicing those relevant client needs. One of the respondents noted that *"If a bank understands its customers and their needs, it will develop relevant products and will generate revenue from those products…"*. Departments that have more data available for their use and product formulation tend to have more clients and perform better than those without. To substantiate this point, Gupta et. al (2020) also noted that to achieve organisational performance, there ought to be a balance of capabilities and resources. This ensures high accuracy in predicting what the market trends are, and what products need to be developed to meet the rising needs of clients.

b) Competitiveness in banking

It was uncovered from the interviewees that insights drive the product development that eventually contributes to value generation. BDA proof of concepts are generated by a bank, and these seek to find ways in which a business can add value and remain competitive in a changing environment. One interviewee makes the point that *"to have a competitive pricing in our products, we often build models which will tell us the right credit profile of the client…"*, and another interviewee noted that *"we use data to develop competitive banking products, without the right data we would not be able to remain competitive…"* Banks compete aggressively with one another, and to win market share, each bank must use what it knows about its clients to develop products. The research conducted by Mikalef, Krogstie, Pappas, and Pavlou (2020) also argues that big data enables firms to understand its own voluminous data and to derive strategies that will guide and ensure that they remain competitive in the market.

c) Fight fraud and financial crime

Interviewees mentioned that BDA models built by highly skilled quantitative teams enable banks to predict fraud incidents. An interviewee noted that *"with many data points we can predict based on fraud trends who is likely to commit fraud…"* What contributes to fraud is the availability of data which criminals have access to via data leaks and breaches. The application of the right analytics can inform the organisation of odd behaviours

when compared to clients' predictable behaviour from the past. According to Pillay (2015), many cyber frauds within banking are a result of reckless behaviour from clients but the cost is often incurred by banks to avoid reputational damages. Big data being vulnerable to leakages to the wrong groups poses major risks for the data discipline. When banks use BDA to prevent fraud and the costs associated with it, they reap the financial benefit of BDA.

5.2.4 Conclusion

It can be deduced from the responses that there is an adoption of BDA within the banking industry as all stakeholder groups mentioned the high usage of big data within their organisations. Across all stakeholder groups, there is a perception of the usage of BDA due to the value associated with its use. There are, however, notable skills gaps within the discipline, wherein the organisation both struggles to source and to keep its top talent, a risk that has financial ramifications down the line. The researcher was unable to accurately investigate the correlation of the lack of skills risk with the bank's performance. However,

the banks are being rigorous in their recruitment process for data analytics skills because they associate the right skills with the ability to contribute value within the organisation.

Although there are positive perceptions in the value derived from BDA, there are some negative perceptions in the state of the usability of the data, cleanliness, and influx of volumes through the respective banks. Interviewees mentioned that there are vast amounts of data that are unusable and as a result, do not add value but add costs in storages, systems, and information technology infrastructure. However, senior management sees the value of BDA outweighing the highlighted risk costs and therefore, having a positive perception in the availability of data and the constant need to have it analysed to help the business increase its performance and help them know their customers better.

5.3 What innovative developments do bank executives perceive from integrating BDA?

The second research question aimed to uncover what innovative developments banking executives perceived in their integration of BDA. To answer this question, the interviewees discussed three global themes: banking products, competitive advantages brought by BDA capabilities, and data products.

5.3.1 Banking products

a) Pricing advantages

Interviewees concurred that pricing is the most important lever in banking product development because of the homogeneity of products. One respondent noted that

innovations fail due to the lack of relevant pricing. Another interviewee noted that *"when creating a new product… you need the right price to take to the market…"* This is supported by Ciampi, Demi, Magrini, Marzi, and Papa (2021), who found that the incorporation of BDA in the business model impacts business positively, and that beyond this, it also aids in new products and services that are created. Banks price competitively because the market is very price sensitive, and they want a bank with the right price because products are the same. Each of the banks were found to have multiple pricing teams and specialists for each or across the different product houses.

b) Credit products

Interviewees mentioned that having strong BDA when developing credit products is critical because the credit discipline is highly regulated in banking, therefore teams must be adequately equipped analytically to navigate large volumes of data in and outside of the bank. Two interviewees emphasised the intense modelling that takes place when developing credit products. They note that consumer data, profiles and overall industry data are highly regulated. Without BDA capabilities, it would be difficult for a bank to compete in the credit space. The common thread within the four banks that are part of this sample is that the credit department is the second largest after accounts personal banking.

5.3.2 Competitive advantages

a) Different client views

The interviewees concurred that what gives an organisation a competitive advantage is the ability to better understand their customer. With many data points about the banks' clients and analytics linked to those points, an organisation can understand end to end interactions with clients, their experience, pain points and peak moments in their journey with the organisation. This becomes very valuable to the bank as it allows the organisation to manage risk, reduce client attrition and increase their customer experience. This is in line with literature from Kuehnl, Jozic, and Homburg (2019), who stated that organisations with data about their clients try to manage their customer experience because that data reveals many touchpoints, direct or indirect, a client has with the organisation.

b) Valuable information and insights

Interviewees also mentioned that the advantage of having BDA capabilities is that the organisation is better equipped to achieve business goals. Those goals are related to a bank's performance, which can only be achieved when the relevant teams have the right information about how to achieve them, from which market, and which customer need to be onboarded to achieve those goals. The majority of those interviewed mentioned that knowing the market segmentation is important because banks operate in diverse markets and to determine the right strategy, this information is necessary. There were also some from the interviewed group that believed that customer segmentation is one of the advantages brought by the BDA capabilities. In an article by Tweney (2013), it is mentioned that BDA capabilities help the organisation to better understand customer segmentation, customer targeting, and

just in time recommendations. This advantage helps firms achieve their goals and objectives.

5.3.3 IT capability

a) IT capability

Interviewees discussed the importance of having a capable IT infrastructure that can give the organisation the ability and advantage of handling big data, cleaning it and deploying it. They mentioned that there are big challenges in executing the strategies quicker because of slow IT processes and unclean data. One interviewee noted that *"IT slows us down when we want to launch a product… business might not prioritise because they think the product will not be deployed…"* The advantages of IT capabilities as outlined by Wamba, et al. (2017) ensure that an organisation can deploy and make use of distinct valuable IT resources to differentiate themselves in the market.

b) Client financial dashboards

Respondents mentioned the importance of the senior management's understanding and interpretation of the financial dashboards. This can become difficult for senior management especially because there are often too many dashboards to consider, sometimes bringing confusion in the process of selecting which layer and approach to select when making a decision. This is in line with findings from Gupta et al. (2020), who noted that the financial performance is affected by BDA outcomes such that managerial skills required for decision making are critical. Managers should

have the capacity to interpret and categorise data, allowing them to make and execute decisions, which will demonstrate the value of output from BDA.

c) 3rd party data

The interviewees also discussed that the ability to integrate 3rd vendor data into the organisation's ecosystem can be an advantage. The banks deal with a lot of3rd party vendors and the integration is not always easy, and that 3rd party data often has a linear usage. If BDA is applied correctly and is matured within a bank, it can help the business to broaden its lens when conducting business. In a study by Wamba, et al. (2017), it was noted that the integration of data and its capabilities ought to be supported by the right IT, which is an advantage a firm can have, and it can be used to both shape and support the business strategy.

5.3.4 Conclusion

It can be deduced from the responses and discussions by interviewees that there is innovation value and advantages that are brought by BDA capabilities. This is seen from how products are developed and the capability that allows the execution of these ideas emanating from BDA capabilities. The respondents in the study did, however, raise concerns on limitations in IT capabilities, 3rd party data integration, and managerial interpretation of data. This is a concern as it hinders the study to fully conclude that BDA contributes to the innovation process without any hindrance. What is clear is that this limitation is within the readiness of banks, its managerial skills, and capabilities not in BDA as a tool. There was consensus from the interviewees that BDA does contribute to innovation but with these limitations as concerns.

5.4 What customer experience do bank executives perceive by integrating BDA?

The third research question was asked to ascertain whether banking executives perceived any potential customer experience benefits from the integration of BDA. To answer this question, the interviewees discussed three global themes: customer analytics, customer experience analytics, and product strategy.

5.4.1 Customer analytics

Interviewees believed that customer analytics enable the business to have knowledge of their client's profitability, i.e., their present and future value. Customer analytics enables banks to understand the onboarding of clients, servicing through the bank channels and to reduce cancellations. One interviewee mentioned that *"what we need mostly from CX [customer experience] is understanding customer journeys, having big data analytics and insights allow us to do journey mappings and have deeper understanding of clients…"* Customer experience is a customer's response in engaging a firm before they are a customer, when they have been onboarded to become a customer, and post the consumption of the goods or services, and even beyond them being an active customer. In this way, a firm can differentiate itself from the competitor (Holmlunda, et al., 2020).

5.4.2 Customer experience analytics

Interviewees mentioned systems which enable them in their respective businesses to utilise customer experience analytics. Some of the platforms were Adobe Analytics and custom made CX platforms by Microsoft and Mastercard test and learn. These platforms

empowered employees to be able to complete customer journeys by only ingesting the relevant data. The interviewees also mentioned Net Promoter Scores (NPS) as being some of the issues they are battling with, wherein NPS are reflections of what customers think of the brand of the bank. The interviewees reported that they are facing low NPS, and this is a threat to their organisations because it means customers are not satisfied with the service and the brand they stand for. There was a common understanding that the availability of BD allows various banking teams to better understand their customers and their related perception when it comes to experience. Studies conducted by Holmlunda et al. (2020) and Meyer & Schwager (2007) also posit that customer experience management has been introduced, looking beyond understanding customer journeys, but also including customer perceptions about the organisation and its surrounding atmosphere.

5.4.3 Product Strategy

Interviewees concurred that the availability of BDA informs their product strategy. They mentioned that how customers respond to the products during test stages will guide how they should approach the entire market. It is the experience of the customer test sample that sets the tone for launching a product. Managers are often tasked with mapping all the data points needed for product strategies. Some of the challenges managers face relates to the costs associated with the data needed, its storage and the skills needed to conduct big data analytics techniques to inform product strategy. In a study by Holmlunda, et al. (2020), a framework is offered which guides managers not to include all data types, master all data analytics techniques or extract all insights because that will lead to information overload.

5.4.4 Conclusion

In conclusion, it can be deduced that there is value to be derived by banking customer experience managers from BDA capabilities. However, interviewees mentioned the challenges introduced by the scaling of CX analytics to include the heavy needed financial support and business prioritisation. This paper could not address these challenges sufficiently due to the scope of the research and what it was set to investigate. It can be concluded, however, that the adoption of CX analytics and management by banking professionals has enabled them to improve their view of customers. These insights add value according to the interviewees as they can come up with strategies to mitigate any customer loss and initiate improvements in areas that have been found to cause customer drop-offs. They can track the levels of satisfaction of customers through metrics like the NPS, which are enabled by availability of granular data points about customers and analytics.

Chapter 6: Conclusion & recommendations

6.1 Introduction

In this chapter we will present conclusion of this paper from the results discussed in the previous chapter. We will present recommendations in literature covered and future studies. The presentation will be in research questions as done in the discussion of the results.

6.2 Conclusion of the research

In recent times big data analytics has proliferated exponentially within the banking sector, big data and analytics have become buzz words. This paper was aimed to investigate the value perception associated with big data analytics in banking from senior management within the South African banking sector. The researcher encountered scarcity of literature covered in big data analytics in the South African banking sector.

Therefore, this research posed three questions across four of the largest banks in South Africa with the purpose of gaining managerial perception of the value of big data analytics. The first research question was how banking executive perceive value derived from the adoption of big data analytics. The research did find that there is a perception of value from the adoption of big data analytics, and all four major banks have in some way adopted big data analytics. All interviewees had a basic understanding of a definition of big data analytics, and they agreed that the ability to predict and structure voluminous information, using the right tools is beneficial to a bank. This is in line with Gupta, Drave, Dwivedi, Baabdullah, & Ismagilova, (2020) that the ability to organize, categorize, and analyse big data drives success of an organization. The capability of people's skills, tools of trade, and insights from big data analytics are the main themes emanating from the interviewees when answering research question 1. The theoretical background of big data predictive analysis (BDPA) is the backbone that answers this question.

The second research question was research question investigated the innovation benefits from the inclusion of BDA within the banking sector in South Africa. The research found that the interviewees concurred on big data analytics' capability to inform product development and offer competitive pricing, segmentation advantages, and market

positioning. They recognised that the enabler of innovation is IT capability, however they did express challenges a bank faces due to slow IT capability. Those challenges lead to lack of strategy execution, slow reactions in the market, and slow innovation engine. From the views and perspectives shared by the interviewees, IT capability is a function of an innovative bank, and the quality of the capability will result in a performing organization. This is in line with Wamba, et al., (2017) finding that there is positive relationship between IT capability and a firm's performance.

The third and last research question dealt with the perception of customer experience benefits from the adoption of BDA. The was consensus from the interviewees that the more you know about clients, the better you will be in understanding their needs. Big data analytics brings this value for an organization and exposes it to possible ways of serving them better through customer analytics and management.

The following section will summarise the key findings of this paper by research questions.

6.3 Summary of findings

Research Questions	Key findings
How do South African banking executives perceive the potential	● Managers and senior management understand what big data analytics is and they acknowledge the use of its technology in banking. ● There is benefit in processing the right data for purposes of transforming the data to add value

value to be derived from adopting BDA?	● High volumes of data pose a challenge and there is high cost associated with storage and handling capacity. ● The capability of advanced analytics and the right data processing tools are an important factor in the big data analytics value equation. ● Data skills play critical role in harnessing value out of big data ● The sourcing of technical skills remains a challenge, the banking industry needs quality data skills ● The value of BDA is its ability to generate insights for an organization, insights enhance organization's performance, competitiveness advantages, assist in fight against fraud and financial crime
Do banking executives perceive any potential innovative developments benefit from the integrating of BDA?	● Big data analytics contribute towards the development of banking products ● Value in product development is offered through differentiation as many banking products are highly homogenous. Pricing, credit, savings, and investments are key themes for differentiation. ● Competitive advantage is derived from an influx of insights and granular details needed for client unique innovation solutions. ● Information technology capability is important for innovation, BDA thrives when there is functional IT capability

	● Banks battle with IT capability as they try to manage costs and end up not prioritizing all innovation ideas, leading to challenges in harness the full potential of BDA ● There is low integration of 3rd party in the banking data atmosphere, this is a hindrance in harnessing full innovation potential
Do banking executives perceive any potential customer experience benefit from the integrating of BDA?	● Customer analytics enables knowledge on the value of clients, solutions are often created for client's need at a point in time. ● Cancellations can be reduced with the right analytics that dig deeper in the understanding of clients. ● It is important to understand a client before they an active customer, while they are in the business and when they have left the business. Enhance customer experience of similar clients will often result from this understanding. ● Customer experience analytics as a capability and platforms like, Adobe analytics, Mastercard test and learn add value to how a bank views their customers. ● BDA allows for customer journeys mapping much quicker. ● Understanding of customer pain points and their rating in metrics like Net Promoter Scores (NPS) is what customer experience battles with. Banks are currently facing low ratings due to lack of understanding of customer pain points and low NPS.

6.4 Recommendations

In this section the researcher will recommend ways in which the data and analytics community can add value to business as well as recommend future studies that can add to the body of knowledge within this topic.

6.4.1 Bank specific case studies

Due to the scarcity of literature tackling big data analytics in the South African banking sector, there should be a concerted effort by scholars and banking professionals to find case studies that will expand the body of knowledge in banking. A starting point could be areas identified by this paper as being troublesome in articulating the value perception of big data analytics in banking. These areas are:

- IT capability as a big data analytics capability

  Information technology capability can be used for transforming big data capability in banking. Management should adopt big data infrastructure and tools in developing proof of concepts, minimum viable products, and value proposition in realizing big data analytics value. It was clear from the respondence that there is a low uptake of IT capability in big data analytics and the adoption can generate value in ways of working and technology capability of a bank. IT capability should be positioned in design stages of projects and not be an afterthought in the value pipeline.
- Big data analytics infrastructure

  Through the deployment of big data analytics infrastructure, the value of big data an organization has can be quantified and strategies can be developed to convert the

data into executable insights that will result into value of a sort. It is important for banks to keep up with big data analytics infrastructure trends and value conversion techniques to advance their data strategies into execution.

- Data skills and sourcing

  To convert big data analytics into meaningful value an organization needs a workforce with adequate skills to source, clean, analyse, and deploy data. A bank needs to have specialised sourcing team that will bring highly skilled data citizens into the organization. Investment in data skills must be accompanied by the right sourcing teams capable of bringing the best in class in this niche disciple.

Finally, this study is an important contributor in the field of big data analytics in banking. It addresses the business management problem of articulating value derived from big data analytics. It offers future research opportunities that can be explored from the discipline of big data analytics, value, and banking industry.

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Appendix A

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Study Information Sheet

This research investigates the perceived value-based adoption of Big Data Analytics (BDA), in an emerging economy, taking a qualitative approach for South African banks. In this research unstructured interview has been elected by the researcher because it is flexible and allows the interviewee to fully express their expert opinion.

It is envisaged that this research will be published in the Wits internal journal for further studies by other students who might be interested in carrying through this study. The purpose of the MBA thesis is for students to develop a strong belief about a particular topic or subject, officially declare that belief on that subject within the beginning of the thesis, describe the process by which is intended to prove this belief, carry out that process, and finally describe the results of the process and write a conclusion.

Your assistance will be truly appreciated, and you are welcome to question the researcher about the study to get a better understanding of the research being carried out.

Yours sincerely

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Interview Consent Form

- I the undersigned have been given the opportunity to ask questions about the research.
- I understand participating in the research will include being interviewed and recorded.
- Enough time has been afforded to consider my decision and I consent to take part in the research.
- I understand that my words may be quoted in publications, reports, web pages and other research outputs but my name will not be revealed.
- I agree to assign the copyright I hold in any material related to this project to Thembela Khedama.
- I understand that I can withdraw from the study at any time, and I will not be asked any questions about why I no longer want to take part.

Name of Participant:

Signature of Participant: _____ Date: _____

Researcher Signature: _____ Date: _____

Appendix B

Schedule of interview question

The researcher made use of an unstructured interview with one question and an aide memoire.

Question:

How is big data analytics adding value in banking?

Aide Memoire (Summary of questions of interest):

Big Data Analytics

1. What is your common understanding of big data?
2. What is the role of big data analytics in product development?
3. What is the role of big data analytics in innovation?
4. What is the role of big data analytics in technology improvement?

Perceived Value

5. What contribution does big data analytics has on customer experience?
6. What contribution does big data analytics has on the financial impact of a firm?
7. Do you have any other considerations of the value of big data analytics?