Data centralisation as a key enabler of digital transformation in South African banks

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ABSTRACT

This research report investigates the inhibitors of data centralisation in digital transformation. The study focuses on retail banks in South Africa, as these institutions aim to become customer-centric. However, the adoption of digital technologies and data strategy implementation are cumbersome due to legacy systems. The existing theoretical framework is that organisations undergoing a transformation need to understand how to adopt and implement new technology. It leverages emerging technologies, strategic organisational direction, and competitive factors as drivers for adoption. Literature specifies that there needs to be an informed digital culture and data operating model championed by leadership to ensure organisational change. Retail banks face challenges as they hold valuable customer data to offer exceptional user experience but have challenges becoming data-driven organisations due to silos, bureaucracy, and implantation capabilities.

Qualitative research, in the form of semi-structured interviews, was conducted with executives and middle management from the top three retail banks in South Africa. The study found that there is a gap in data strategy formation to address a digital strategy, silos in the operating model, data roles and skills, data-driven culture and implementation challenges to manage data and integrate to new technologies. It was found that data centralisation requires the support of a leadership drive.

Several challenges were highlighted in line with the research questions, and recommendations were proposed: lead a data-driven strategy, adopt a customer-centric culture, expand data capabilities, centralise data management, and modernise architecture and technology.

KEYWORDS

iii. Digital transformation
iv. Data strategy
v. Data centralisation
vi. Customer centricity
vii. Digital culture
viii. Retail banking

DECLARATION

I, Keitumetse Monyamane declare that this research 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 Management in the field of Digital Business at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Name: Keitumetse Monyamane Signature_____K.M_____

On the **29th day of February 2024**

DEDICATION

To my lovely parents, thank you for everything. Would have never made it this far without you. This one is for you.

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Firstly, to the Most High - thank You, God!

To my parents, thank you for your sacrifices that got me this far. Your prayers and encouraging words have held me through the tough times. Your support is much appreciated, kea leboga!

To my siblings, thank you for believing in me and supporting me – I know you can do it too!

To my supervisor, Dr Ayanda Magida, your guidance through this process is greatly appreciated, thank you!

To all my loved ones who supported me through – thank you so much!

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ACRONYM	
4IR	Fourth Industrial Revolution
AI	Artificial Intelligence
CDO	Chief Digital Officer
CEO	Chief Executive Officer
CIB	Corporate & Investment Banking
CIO	Chief Information Officer
COO	Chief Operation Officer
CTO	Chief Technology Officer
EXCO	Executive Committee
GDP	Gross Domestic Product
IOT	Internet of Things
IT	Information Technology
MANCO	Management Committee
P2P	Peer-to-Peer
ROI	Return On Investment

CHAPTER 1. INTRODUCTION

1.1 PURPOSE OF STUDY

This qualitative study explored digital transformation in retail banking in South Africa. The research explored the application of digital transformation and data strategy approaches and further investigated the challenges of data centralisation.

1.2 BACKGROUND OF THE STUDY

The Finance industry in South Africa is one of the largest and contributed 20% of total nominal value-added and was up to R228 billion nominal GDP (Statistics South Africa., 2020). This industry is well known for its bureaucracy and rigid regulations, leading to innovation limitations, especially within banks. However, this has provided a good opportunity for tech companies to have an advantage and footprint within the Finance sector through Fintech start-ups. According to new research, Fintech companies are not subject to specific regulation and compliance restrictions (Manatt, Phelps & Phillips LLP, 2021).

The Finance industry is transforming globally. It is pivotal that the banking sector prioritises digital transformation as a key business strategy to become successful in this new age. Retail banking has shown remarkable growth in digital innovation and disruptions such as mobile money, peer-to-peer (P2P), online vouchers and QR payments. In 2020, the COVID-19 pandemic forced multiple retail banks to accelerate the digital transformation within retail banking (Deloitte, 2020). Banks had to cater to online customer service and an employee remote operating model for payments. This acceleration in digital transformation has created a gap in employees' knowledge regarding the adaptation of digital technologies and new ways of working (Nachit & Belhcen, 2020).

An argument has been put across that for digitalisation to succeed, there should be participation, motivation, and accountability from the resources (Moloi, Zibani & Teane, 2018). Furthermore, South Africa lacks adequate skilled resources to handle a digital transformation and implement 4IR technologies. These skills are new and unavailable in developing countries. The lack of these skills is further growing due to a digital divide in South Africa caused by a large population lacking internet access (Fuchs & Horak, 2008).

South Africa's retail banking continues to face the challenge of catching up with the global trend of end-to-end digital banking. This means that multiple banks may have the capability of digitalising tasks but remain with the issues of back-office legacy systems and data decentralisation (Accenture, 2019a). As a result, process optimisation and efficiency are compromised.

The impact of adopting digital transformation within the banking sector improves performance, efficiency, and cost-savings (Hartman Advisors., 2021). To achieve customer-centricity, banks need to prioritise digital technologies such as AI, big data, and robotics to enhance asset sharing, collaboration, and personalisation. Therefore, the next step of back-office digital transformation within retail banking is crucial.

1.3 RESEARCH PROBLEM

Banks have been known to offer traditional 'bank-driven' products solely focused on yielding profits rather than products focusing on customer needs (PWC, 2021). Banks have a plethora of data about a customer from multiple product divisions such as savings accounts, credit accounts, vehicle finance accounts, and home loans. Data for each customer is stored in a decentralised manner, with no adequate way for the bank to know their customers and determine their behaviours from a bank lens compared to a product division lens - affecting how

data is centralised and used effectively by the business to make decisions. The absence of centralised data management systems hinders the bank's ability to understand its customers comprehensively and analyse their behaviours from a whole-bank perspective (Petrović, 2020).

In the past years, customer centricity has become more important from a service and product perspective. Customers want to be ensured that the bank knows them and want an exceptional customer experience. Banks are expected to offer customers more convenient and smart solutions than uprising Fintechs. Technologies such as artificial intelligence, automation and robotics are becoming pivotal to solving customer challenges and providing products better suited for a customer's needs (HSBC, 2019). It is pivotal that banks centralise customer data and improve the overall customer experience to adapt to digital technologies through a digital transformation approach.

1.4 RESEARCH QUESTIONS

The main questions the research sought to answer are as follows:

a. How does digital strategy and culture affect the implementation of becoming a data-driven retail bank during a digital transformation?

b. Which aspects are inhibitors of implementing data centralisation and how does technology and architecture impact implementation of data centralisation?

1.5 SIGNIFICANCE OF THE STUDY

Digital transformation literature is continuously developed as a new concept. However, the application of digital transformation within retail banking in South Africa and the challenges of data centralisation are currently limited.

This research is intended to assist various stakeholders within the banking sector and industry.

Table 1-1: List of stakeholders

Stakeholder	**Significance**
Board of Directors	A group of sponsors and advisors who provide buy-in to ensure ROI in all bank initiatives.
C-Suite	A group of executive leaders in the bank, such as the CEO, COO, or CTO, has driven top-line or bottom-line goals and signed off on transformations within the bank.
Exco & Manco	A group of top management and middle management within the bank. These vary from Head of department to manager of the working team.
External consulting partners	The group of management consulting firms who may assist with driving the project management and delivery of strategies and roadmap to achieve the transformation. They will have a blueprint to follow in specific needs topics that may have not been implemented within the South African context.
Industry thought leaders	A group of industry senior experts such as entrepreneurs, partners, and independent advisors.

1.6 DELIMITATIONS OF THE STUDY

1. This study focuses on the challenges of decentralised data in retail banks in South Africa, which inhibit customer centricity. Therefore, the approach is to understand the impact of decentralisation and how it impacts data centralisation as a key enabler to successful digital transformations rather than the technicalities of implementing a centralised data management system.
2. The study will follow a case-study approach and focus on three large traditional banks in South Africa.
3. The study does not include other divisions in the banking sector, such as Wealth, Commercial or Corporate Investment Banking.
4. The study does not include banks outside of South Africa.
5. The study does not investigate government-owned entities such as development banks.

1.7 DEFINITION OF TERMS

Digital transformation: refers to anything from IT modernisation (for example, cloud computing) to digital optimisation to the invention of new digital business models (Gartner , 2021).

Customer centricity refers to a philosophy that emphasises the importance of focusing on customer knowledge and customer value opportunities in every business decision (Troilo et al., 2017). It is closely linked to service quality, as

assessing service quality typically involves measuring customer satisfaction and meeting customer expectations (Li et al., 2017).

Data strategy: crystalises the business case for transformation—identifying, valuing, and prioritising the core set of initiatives and use cases that stand to deliver the strongest returns by examining where data, analytics and people can come together to improve quality, service, and value (McKinsey & Company., 2018).

Digital technologies: refers to a diverse array of technologies, tools, services, and applications that utilise different forms of hardware and software such as AI, IoT, Automation, Big Data (Rice, 2003).

Big Data: describes a range of different concepts, from the collection and aggregation of vast amounts of data to a plethora of advanced digital techniques designed to reveal patterns related to human behaviour (Favaretto et al., 2020).

Retail banking refers to the branch of banking that offers financial services to individual consumers, as opposed to services provided to corporations or other banks (Stratulat, 2021). Retail banking is characterised by a focus on establishing relationships with customers, understanding their financial needs, and offering personalised services to meet those needs (Boukis, 2015).

1.8 ASSUMPTIONS

The following assumptions have been made regarding the study:

1. All participants in interviews will be able to respond to questions.
2. All participants understand the concepts (digital transformation, digital technologies, etc.) being evaluated.
3. All participants will answer questions honestly.

4. Data required from participants to answer interviews and surveys will be accessible.

1.9 REPORT OUTLINE

Chapter 1 of this report presents the purpose of the study, the research context, the research problem, its significance, and its delimitations. The chapter also defines the terms used in the report and the assumptions made regarding this study.

Chapter 2 highlights the research's propositions. It reviews previous literature on digital transformation and implementation challenges in South African banks. Technologies and legacy systems are discussed. The research's propositions are highlighted, and theoretical frameworks are reviewed.

Chapter 3 elaborates on the research methodology, covering the research approach, design, data collection methods, population and sample selection, and the research instrument. Additionally, details are provided on the data collection process, analysis, and interpretation, as well as the study's limitations, transferability, dependability, respondent demographics, and ethical considerations.

Chapter 4 presents the research findings, while Chapter 5 discusses them. Finally, Chapter 6 concludes, addressing the research questions and offering recommendations for potential future research.

CHAPTER 2. LITERATURE REVIEW

2.1 INTRODUCTION

This chapter offers a detailed examination of how data strategy plays a crucial role in banks' digital transformation. It underscores the importance of creating a thorough data strategy involving orderly management and data use to support business decisions, boost operational efficiency, and enhance customer service. A key aspect of a successful data strategy is centralising data, which means gathering data from various sources into a unified, easily accessible location. This step is vital for retail banks to analyse and utilise their data effectively. Banks face the challenge of updating old systems, ensuring strong data privacy and security measures, and creating a culture that values data across the organisation. The literature review in this chapter compiles advice from experts and recent studies, providing banks with a guide on developing and executing a strong data strategy. By navigating the challenges of data centralisation, banks can maximise their data's value and secure a competitive edge in the digital banking landscape.

2.2 DEFINITION OF TOPIC OR BACKGROUND DISCUSSION

Innovation is drastically changing how firms operate (Henfridsson, 2013), and organisations must implement digital technologies to organise and stay ahead of the curve (Kallinikos et al., 2013). Digital technologies are resources and tools used to harness innovation. Digital technologies have significantly transformed the banking sector, providing benefits such as timesaving, cost reduction, and improved monitoring and risk management capabilities (Kitsios et al., 2021). This is due to these technologies' efficiency, convenience, and productivity.

Conversations in boardrooms by leaders around the globe are to go digital; with that, a misuse of the words digitisation and digitalisation has formed. "Digitisation"

and "digitalisation" represent two key concepts associated with digital technology and the process of innovation (Gradillas & Thomas, 2023).

Digitisation is changing a remote or analogue process to a digital one. While digitalisation has a broader definition, it is the use of digital technologies to achieve digitisation in the organisation (Zeranski & Sancak, 2020). Achieving digitisation in the banking sector is expected to significantly enhance market share and stability, highlighting the essential role these technologies play in promoting growth and competitiveness within the industry (Lestari et al., 2023). Furthermore, technological advances have led to the development of innovative products and services, enhancing customer satisfaction and service quality in the banking sector (Rus, 2017).

In the drive to adopt digital transformation, it is important to take into account that data plays a pivotal role in the digital transformation journey of an organisation, serving as a crucial catalyst for their digitisation efforts (Pettey, 2019). Pettey (2019) further expands that despite the importance of data, currently, less than half of the corporate strategies documented incorporate data and analytics as core elements for enhancing business value. Gartner forecasted that by the year 2022, most corporate strategies, approximately 90%, will specifically recognise data as a key organisational asset (Pettey, 2019).

In this digital era, organisational transformations have become synonymous with securing a competitive edge, with many companies integrating digital transformation into their strategic planning. While there is no consensus in the literature regarding the exact definition of digital transformation (Ismail et al., 2017), for this discussion, the consensus that will be used in this paper is that digital transformation is a process of adopting capabilities to build value creation and improve a business operating model. This perspective bridges the gap between the strategic use of data and the broader goal of achieving digital transformation.

2.3 DIGITAL TRANSFORMATION

2.3.1 *Strategy*

Digital transformation aims to completely transform how the business works, plans its strategies and engages with customers (Olayinka & Wynn, 2022). According to Correani et al. (2020), up to 84% of digital transformations fail. Organisations with a poor understanding of digital transformation failed (Kotter, 2016). It is pivotal that digital transformation involves organisational change and culture to succeed. It is critical that organisational behaviour starts at an executive level and that management leads by example. It is encouraged that an exemplary change leader is present in the organisation to ensure there is governance and management of the transformation.

A digital strategy should be in place before implementing a digital transformation. A digital strategy is a combination of an IT and Business strategy. A clear roadmap should depict the digital technologies, capabilities, solutions, priorities, and initiatives to support the strategy. An IT strategy encompasses an organisation's systems, technologies, and people who manage them. This includes strategies such as the solutions architecture, tools, server, security, IT infrastructure, IT environment, employee access control, etc. In traditional organisations, the IT strategy is owned by a CIO.

A business strategy encompasses initiatives and plans to bring a competitive advantage towards a corporate strategy. These include strategies focused on Financial, Operational and Marketing. Combining an IT strategy with a business strategy to form a digital strategy allows a strategy to be driven at a corporate level to ensure alignment between stakeholders within an organisation. This enables new business models to form and yield a Return on Investment (ROI) on digital technologies and capabilities. A leader champions a digital strategy called a CDO and ensures it is implemented accordingly during a digital transformation

(Rickards et al., 2018). The duration of strategy and transformation depends on the organisation's digital maturity.

Digital maturity determines an organisation’s performance on a digital maturity model. Digital maturity refers to the integration of digital technologies in transforming how organisations work (Kane et al., 2015). Although De Bruin et al. (2005) state that research argued that linear models are inflexible, Becker et al. (2009) say that it can be described on an ordinal scale of low to highest - not mature to mature. Focusing on the digital transformation's key functions, namely digital strategy, digital activities, and operational excellence, will help achieve digital maturity (Hie, 2019).

2.3.2 *Culture within Retail banking*

According to Wade’s (2017) digital vortex analogy, the Financial Services industry is one of the top four disruptive industries in digital innovation. Financial services such as banks and insurance are known for rigid rules and bureaucracy. The digital era has changed, and customers want to engage with banks often, beyond the regular bank tasks such as sending and receiving money. Therefore, customer experience matters. This has changed the way that banks operated in the past.

Figure 2-1: The Digital Vortex (Wade, 2017)

In the past, banks were serving a basic and straightforward task. The bank processes' systems and technologies were built on are some of the banks' most tedious and challenging parts of innovation. Known as legacy systems, they are outdated, disintegrated, and inflexible when adapting to business rules. Unfortunately, as their banks transform their businesses, there is a compromise that only the customer-facing interface is digitised while the back-office and back-end remain the same. As a result, banks exist in what is known as two-speed IT (Horlach et al., 2016). The status quo is changing, and banks are required to reassess and adopt some key trends (Discovery Bank, 2021):

- Risk: Enable shared value through cost consideration based on socio-economic factors. A customer's behaviour towards their earnings impacts their risk.
- Tech: Covid-19 has put pressure on banks to digitise their banking services
- Social responsibility: Banks create shared value with clients by offering knowledge and digital solutions which encourage a savings culture rather than a debt culture.
- Digital banks are known as banks that offer electronic or online banking services. Electronic banking (e-banking) services are operationalised services that are driven by technology and do not require an employee touchpoint (Yaghubi & Seyedin, 2003). A digital bank needs to ensure high delivery on key factors that impact the use of digital banking and influence customer adaptability: trust, reliability, responsiveness, ease of use, and convenience.

The theoretical framework adopted in this research refers to the principles that a digital transformation requires and digital culture and learning organisation. Organisations as bureaucratic as banks are built on legacy systems and

cumbersome organisational rules, which poses a challenge to implementing a digital transformation. Westermann's framework is based on four key values of digital culture for traditional organisations: impact, speed, openness, and autonomy (Westerman et al., 2019). The framework (see Figure 2) emphasises that impact is led by leaders who can associate the impact to the organisation's mission and strategy.

It is important for the organisation to learn continuously to adopt a digital culture. According to Göhlich et al. (2018), learning is achieved through three principles: individual learning, community learning, and learning from the organisation. Individual learning is encouraged by employees failing in a safe environment under open-minded leaders.

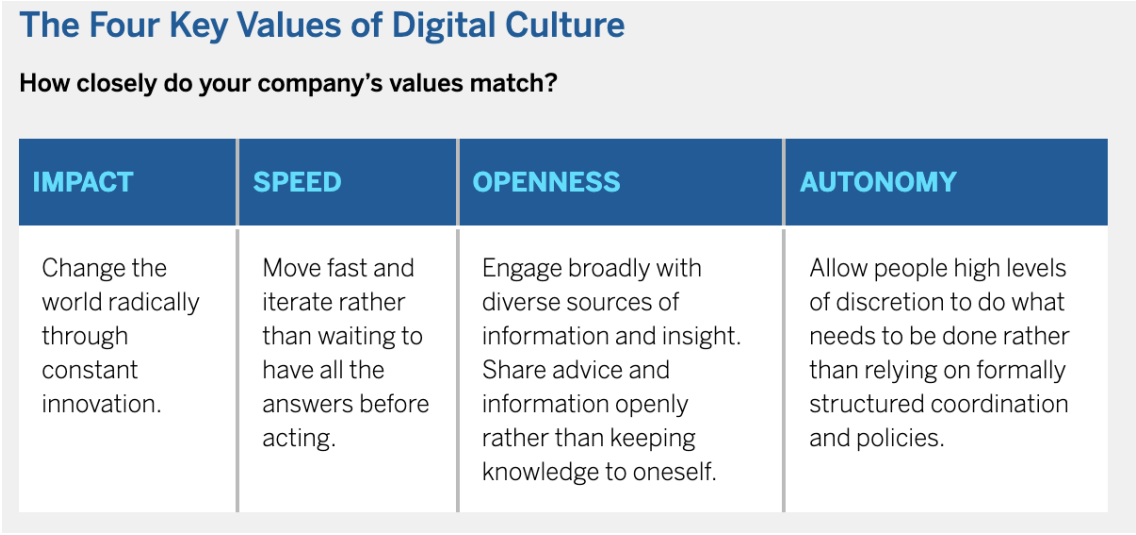

Figure2-2: The Four Key Values of Digital Culture

2.3.3 *Proposition 1*

Digital transformation, along with digital technologies and capabilities, can disrupt the banking industry. To be successful, a digital strategy must be defined, and

top executives must be involved in modelling the culture change required in implementing digital transformation.

2.4 DATA STRATEGY

2.4.1 *Implementation of a Data strategy*

A data strategy is a crucial component for organisations aiming to leverage data-related capabilities effectively (Hernán & Robins, 2016). To support these data-related capabilities within an organisation, a data strategy should consist of five components, namely (1) data identification, (2) data storage, (3) data provisioning, (4) data integrity and (5) data governance (Levy, 2018). Another commonly adopted approach by organisations is to utilise a Chief Data Office to drive the strategic direction of data management in an organisation. It is suggested by Carruthers and Jackson (2017) that when the Chief Data Officer defines the immediate data strategy, it should consist of six elements, namely being (1) data stability and rationalisation, (2) data culture and governance, (3) pre-existing and immediate data initiatives, (4) data integrity and exploitation, (5) data performance, quality, assurance and provenance, and (6) data security. Both Levy (2018) and Carruthes et al (2017) provide the core considerations that need to be considered when formulating a data strategy, they also show that at the core, the foundational concepts of data management are critical in the formation of a data strategy.

Carruthers et al. (2017), suggest that the data strategy is delivered by the CDO, however, to ensure that there is alignment with the broader organisational strategy, data management must be a collective effort from the C-suite executive. Depending on business strategy objectives, a bank can implement a data strategy that focuses on a centralised data source that prioritises governance, compliance, security, integrity, and data quality. A CDO would overlook the corporate delivery of the data strategy. However, in the instance where the

objective is to improve competitiveness, the bank decentralises its data source, and a CDO will be responsible for each division.

Determining how an organisation's data architecture should be engineered can depend on the data strategy objectives and the industry. Healthcare and banking industries have high regulatory restrictions, which impact the security and governance of data management, while the retail sector is flexible and has fewer regulations to abide by. Although banks can follow the hybrid approach, Dallemule and Thomas (2017) suggest a defensive-offensive approach to determining which data strategy to implement in an organisation. In designing the data strategy, a data maturity model is conducted to assess the organisation's current data management so that a CDO can prioritise objectives and initiatives within a digital strategy. It is also known as an artefact for managing organisational data (Becker et al., 2009). Other researchers, such as Spruit and Pietzka (2015), suggest a data maturity framework to unpack barriers due to data structure.

Miragliotta et al. (2018) argue that practices in data management can enhance the performance of production and hold even greater significance for the decision-making processes in future production systems. The strategic use of data coupled with technology can revolutionise businesses by enabling a deep understanding and prediction of customer behaviour, leading to the strategic customisation of services and products (Hassan & Tabasum, 2018). The drive to become customer-centric will be highly determined by how data is utilised, given that the value of data increases as it is utilised more extensively and combined with additional data from various sources (Moody & Walsh, 1999).

The use of technology to support digital strategy are selected based on the initiatives prioritised. Machine learning, automation and cloud computing are technologies that have been successfully implemented by other international banks such as the Canadian Imperial Bank of Commerce (Stanton, 2002). This evidence proves that by implementing the right technologies and conducting accurate data analysis, the influence of data can yield financial profits.

Retail banking has a surge in data volumes due to various factors such as credit risk management, healthcare, media, and retail banking itself (Guha, 2018). This large set of data can be defined as big data, as it is a set of unstructured, semi-structured, and structured data collected from diverse sources (Rehman et al., 2016). The integration of big data technologies with these sectors necessitates a centralised approach to manage and utilise the vast amounts of data generated effectively (Wu, 2015).

2.4.2 *Challenges within the South African context*

Banks, like other organisations, face challenges with data strategy implementation. Retail banks have multiple divisions, such as Vehicle Finance, Personal Finance, and Home Finance, which offer unique products to a group of customers. Data is often stored in isolation per division in a decentralised data management source (Dallemule & Thomas, 2017). The data is often unstructured because it comes from different divisions and is captured following multiple business rules.

There is a lack of a master data source. As a result, repetitive data is often stored in a different taxonomy. With recent digitisation in retail banks and the introduction of multiple online channels such as applications, websites, etc., Bank employees who work in branches and call centres have also had platforms where there could be on-board or amended customer data (Dallemule & Thomas, 2017). The multi-channels have created a challenge with tracking the source of truth with data. Data security is a concern when centralising data sources across organisations. Technologies, data sources, and access management must be closely monitored to ensure the security of customer data. Hence, Spruit and Pietzka (2015) argue that ensuring a data maturity model has become important to avoid any data security risk.

South Africa is a developing country and faces a slow trajectory of advanced data roles and skill sets required to implement a data strategy. According to Fuchs and Horak (2008), digital skills are lacking in developing countries. Moreover, these include advanced Chief Digital officers, data scientists, machine learning engineers, and cloud computing experts, which are recent and not easily available in the developing country market.

2.4.2.1 Data centralisation

The centralised approach to managing data involves consolidating data from diverse sources into a single, accessible location, which aims to minimise data silos and ensure data consistency across the organisation (Tamr, 2023). This approach often results in a centralised team responsible for driving and implementing the data strategy defined for the organisation. On the other hand, data decentralisation distributes data storage, cleaning, and consumption across multiple points within the organisation, embodying principles such as data ownership by domain and treating data as a product to prevent silos (Tamr, 2023). Both approaches offer distinct benefits and challenges, and the choice between them depends on the specific needs and context of the organisation. Integrating these concepts into a data strategy, as defined by Hernán & Robins (2016) and Hassan & Tabasum (2018), enables businesses to harness the full potential of their data, driving customer-centric innovation and strategic decision-making.

Data centralisation ensures that a single source of truth on data is maintained across the organisation. On the contrary, data decentralisation is data that is stored in multiple data repositories. Making it difficult to maintain integrity, access, and security. The benefit of implementing centralised data is that it provides data security, consistency, integrity, and operational efficiency and reduces cost (UBS, 2017). To achieve data centralisation within retail banking, it is important to understand the key benefits of data centralisation in relation to the similarities shared between Levy (2018) and Carruthes et al. (2017). These key similarities

can be noted below as data governance, data security, data access, and data quality.

2.4.2.2 Data governance

Data governance is essential in forming a data strategy, as proposed by both Levy (2018) and Carruthers et al. (2017). Data governance is defined as a comprehensive organisational framework. It aims to allocate rights and responsibilities concerning decision-making processes, thereby ensuring the company's data is effectively managed and recognised as a significant asset (Otto, 2011b). Data governance focuses on identifying the roles and responsibilities of an organisation required to make decisions regarding data assets (Liaw et al., 2014). The key benefit derived from centralised data management is that an organisation can designate a single point of accountability to data owners.

The reliance on a data strategy for data governance and compliance ensures that there are no data bridges on security. Banks need to factor in banking regulations from the Central bank and compliance rules such as the POPIA (Protection of Personal Information Act). POPIA is similar to the EU GDPR and is compliant with international banks and organisations. POPI Act, Big Data Section 26 states that the processing of personal data such as religious beliefs, race, and the health of the data subject is prohibited (Accessible Law, 2019).

2.4.2.3 Legacy Systems in banks

In the context of banking, legacy information systems represent a substantial challenge, particularly when it comes to adopting modern data strategies and

achieving data centralisation. Legacy systems can be defined as systems that are operational for many years and primarily based on imperative programming language paradigms (Edegbe & Onianwa, 2022), are remnants of an era when the computing industry was beginning to grapple with the complexities of digital transformation. The term "legacy technology" originated in the 1980s and underscores these older systems' resistance to upgrades or transitions to more advanced, integrated systems (Fernandez & Beverland, 2019).

For banks, the consequences of relying on such outdated systems are manifold. Legacy systems incur high maintenance costs and present significant technical hurdles in migrating to new technologies. Moreover, the complexity of weaving new business processes into these entrenched systems adds another layer of difficulty (Holland et al., 1999). The architecture and obsolete technology of these legacy systems severely hinder the centralisation of data, a critical aspect of modern banking that drives decision-making, risk assessment, and customer service improvements. Without centralised data, banks struggle to access and analyse information efficiently, thereby hampering their ability to respond to market changes, customer needs, and regulatory requirements quickly.

The integration of legacy systems with modern, data-driven approaches remains a significant engineering challenge within the banking sector. The inflexibility and scalability issues of legacy systems make it particularly challenging to leverage big data analytics, cloud computing, and artificial intelligence technologies that require a seamless flow and central data repository. This situation underscores the importance of strategic planning and investment in technology upgrades or replacements, ensuring that banks can overcome these barriers to innovation, efficiency, and competitiveness in a rapidly evolving financial landscape (Heiligenthal, 2003).

2.4.3 *Proposition 2*

Data must be centralised in order to make good business decisions. Amidst the challenges, South African banks need to follow suit like banks all over the world by prioritising data strategies within digital transformations to ensure that they maximise the achievement of a successful business strategy.

2.4.4 THEORIES AND FRAMEWORKS

2.4.4.1 Data Science Hierarchy of Needs

The Data Science Hierarchy of Needs (Figure 2.3) is a framework conceptualised by Monica Rogati. It is an adaptation of Maslow's hierarchy of needs for data science and AI. Rogati's framework emphasises the foundational importance of data collection, infrastructure, and literacy. The foundational stage of the framework is critical because it sets the stage for all future data evolution efforts. The foundational stage ensures that data is collected, stored, and managed effectively so that organisations can build upon a solid base, leading to more successful and sustainable advanced technologies.

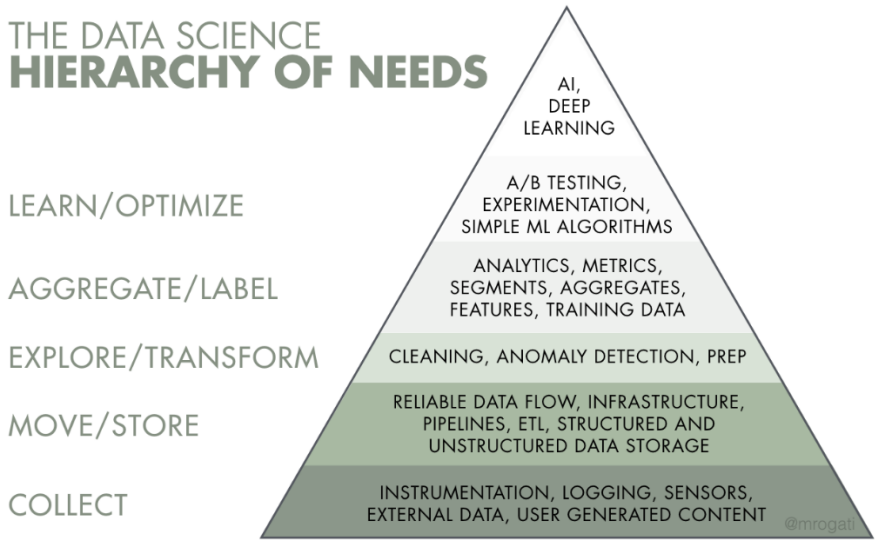

Figure 2-3 Data science hierarchy of needs. (Rogati, 2017)

At its core, the hierarchy emphasises that achieving sophisticated AI outcomes requires a strong foundation in data management, suggesting that organisations must ensure basic data needs are met before pursuing advanced technologies such as Artificial intelligence and Machine learning (Davies, 2022). Adopting this framework in developing a data strategy for banks will give emphasis to the necessity of a strong data management foundation. It reflects a journey from basic data gathering and structuring, to employing advanced technologies. This methodical progression ensures the bank's data strategy is firmly established, facilitating data's strategic and innovative use.

In the context of the framework, the centralisation of data within a bank is fundamental, acting as the base upon which all other levels are built. By focusing on centralisation, banks can address the foundational layers of the hierarchy—collecting and storing data to ensure that data is accessible, secure, and of high quality. The centralisation of data can then support higher levels of the hierarchy, such as data exploration, aggregation, and, ultimately, the use of advanced technologies for predictive insights. Banks can leverage their data assets to drive operational efficiency, enhance customer experience, and foster competitive

advantage in the rapidly evolving financial landscape through this sequential approach.

Within the Data Science Hierarchy of Needs framework, it's crucial to emphasize the importance of possessing the right skill sets at each level of the hierarchy. The Chief Data Officer (CDO) orchestrates the overall data strategy, ensuring that it aligns with business goals while also promoting a data-centric culture. The role of Data scientists is responsible for complex analysis, leveraging statistical methods to extract insights and build predictive models. Together, these roles embody the necessary leadership and technical expertise to navigate through the hierarchy's levels, driving the organisation's data-driven decision-making and innovation without focusing on specific technologies.

2.4.4.2 Data Management Body of Knowledge (DMBOK)

The Data Management Body of Knowledge (DMBOK) framework was developed by the Data Management Association International (DAMA International) to standardize industry practices and principles in data management. It covers eleven core knowledge areas (Figure 4), which encapsulate the broad spectrum of data management activities and highlight the importance of Data Governance as a central element (Earley et al., 2017).

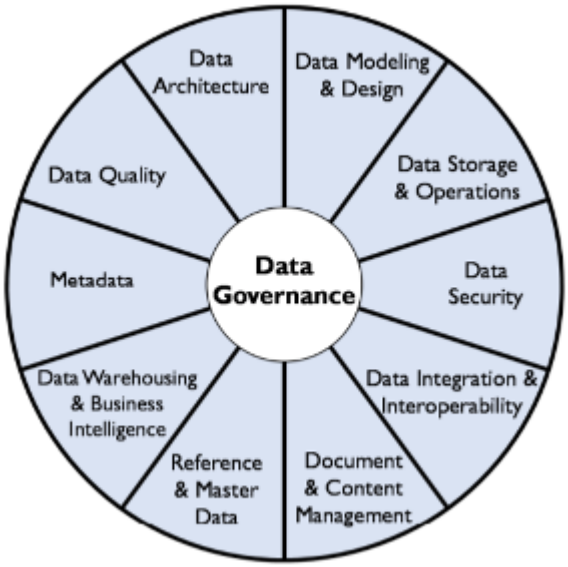

Figure 2-4 DAMA Wheel (Earley et al., 2017)

The framework has been recognized as a critical tool for data management professionals seeking to align their practices with industry standards. It provides a comprehensive reference that guides the development of data management strategies, the implementation of best practices, and the establishment of governance frameworks within organisations. By promoting a standardized vocabulary and a clear understanding of data management roles and responsibilities, the Data Management Body of Knowledge (DMBOK) framework helps professionals across various sectors improve data handling, ensure compliance, and enhance data quality. The framework plays a crucial role in ensuring that data is effectively managed throughout its lifecycle, from acquisition to disposal (Shah et al., 2021)

The Data Management Body of Knowledge (DMBOK) framework can be applied to both data strategy and data centralisation efforts within an organisation to ensure that data management practices are aligned with business objectives and

industry standards. Implementing frameworks principles helps in standardizing data management practices across the organisation. This standardisation is crucial for developing a coherent data strategy that minimises silos, ensures data quality, and facilitates efficient data sharing and analysis.

2.5 ANALYTICAL FRAMEWORK

2.5.1 *Theoretical Framework*

2.5.1.1 Technology-Organisation-Environment (TOE) framework

The Technology-Organisation-Environment framework is a theoretical model that identifies three aspects of an organisation's context that influence the process of adopting and implementing technology innovations. This framework serves as a comprehensive guide for understanding how organisations decide to adopt new technologies (Tornatzky & Fleischer, 1990).

The framework comprises three contexts:

Technology: The technological context focuses on the range of technologies, both current and emerging, that an organisation might consider integrating into its operations. This context evaluates the suitability, capabilities, and potential of these technologies in relation to the organisation's existing technological infrastructure (Baker, 2012).

Organisation: The Organisational context focuses on the internal attributes and strategic directions of the organisation to determine how they support or inhibit technological innovation (Baker, 2012).

Environment: The Environmental context looks beyond the organisation to external factors like industry trends, market conditions, regulatory demands, and

competitive pressures (Baker, 2012). This context assesses how these external factors can drive or restrain technology adoption decisions.

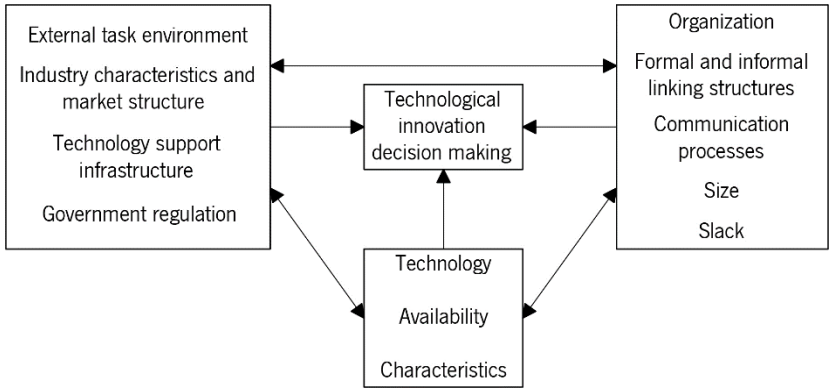

Figure 2-5 Technology-Organisation-Environment (TOE) framework. (Tornatzky & Fleischer, 1990)

The Technology-Organisation-Environment (TOE) framework highlights the critical role that technological, organisational, and environmental contexts have in integrating digital and data strategies, particularly focusing on the importance of data centralisation. From a technological context, embracing advanced digital technologies and data management systems is crucial for making operations more efficient and supporting strategic decision-making. Organisationally, aligning these technology initiatives with an organisation's strategic goals, fostering an environment that encourages innovation, and establishing robust frameworks for data governance are key steps to effectively manage centralised data. On the environmental context, staying flexible and ensuring that strategies meet legal requirements and offer competitive advantage is essential.

2.6 CONCLUSION OF LITERATURE REVIEW

The literature reveals that a data strategy relies on a solid foundation of digital transformation to be implemented first. Retail banking, as an industry, is bureaucratic and requires buy-in from stakeholders in order to be successful. The culture of digital transformation will need to be led by C-suite executives to ensure that it is embedded in the rest of the organisation. A data strategy requires a data maturity assessment to be conducted in order to understand the types of objectives and initiatives to prioritise. A data strategy requires a CDO to lead and ensure that there is a return on investment that directly contributes to the business strategy. Digital technologies need to be selected based on the solutions and skill sets available in the South African market to ensure that there is no failure to implement.

2.6.1 *Proposition 1*

Digital transformation, along with digital technologies and capabilities, has the ability to disrupt the banking industry. To be successful, a digital strategy must be defined, and top executives must be involved in role-modeling the culture change in the implementation of digital transformation.

2.6.2 *Proposition 2*

Data must be centralised in order to make good business decisions. Amidst the challenges, South African banks need to follow suit like banks worldwide by prioritising data strategies within digital transformations to ensure that they maximise on achieving a successful business strategy.

CHAPTER 3. RESEARCH METHODOLOGY

This section outlines the research methodology to be followed, starting with the research approach and design. The data collection methods are discussed, as well as the population and sample, research instruments, procedure, data analysis, limitation, transferability, dependability, credibility, limitations, and ethical considerations. The researcher received ethics clearance from the university to conduct the study.

3.1 RESEARCH PARADIGM

This study adheres to the pragmatic research paradigm, which prioritises addressing practical problems and offering applicable solutions. Emphasising the importance of practical applicability over a singular notion of truth, pragmatism advocates for methodological flexibility tailored to the research question and desired outcomes. Although this paradigm can be a mixed-methods approach, this thesis only integrates qualitative methods to provide a comprehensive understanding of the topic.

3.2 RESEARCH APPROACH

The research uses a qualitative research approach consisting of semi-structured interviews for data collection. This research aims at the inhibitor's data centralisation implementation during digital transformation. The researcher used qualitative questions to interview on digital transformation and data strategy phenomena. Therefore, a qualitative approach is used to investigate the two research propositions outlined in Chapter 2 of this research. The premise of this approach is that it provides the researcher with a detailed and thorough understanding of the participant. Qualitative research ensures that participants'

experience is valued (Clarke & Jack, 1998). The semi-structured interview has the advantage of making the participant feel valued because it involves interacting with participants directly. (Cohen et al., 2011).

3.3 RESEARCH DESIGN

This qualitative research design is conducted generically. In researching the research topic, data centralisation as a key enabler of digital transformation in South African retail banks, a case study method was applied. This method enables researchers to deduce conclusions or new theory (Thomas, 2003). The research follows an inductive data approach to theory development, which starts with collecting data, identifying patterns, and drawing a conclusion. This approach was suitable as in-depth interviews were required across Bank X, Bank Y, and Bank Z to ensure that there were no discrepancies in the different organizational models.

In this research, data were collected based on the research questions formulated around digital transformation and data strategy. The research interviews with participants were in-depth and detailed. The interview enables the researcher to gain an in-depth understanding of the root cause analysis of the situation at the bank. It allows the researcher to thoroughly understand the problem and where the opportunities may lie. It enables the researcher to have an outside perspective and compare similar themes and findings from different retail banks.

3.4 DATA COLLECTION METHODS

Primary data was acquired through semi-structured interviews conducted with senior and middle management personnel in the retail bank division across Bank X, Bank Y and Bank Z. The objective was to understand the participants from a digital transformation and data strategy perspective. The interview guideline in

Appendix A was developed based on a comprehensive review of existing literature from Chapter 2. While certain questions were aligned with the research problem, others were formulated by the researcher. The researcher structured the interview guide and ensured that questions were placed in a bucket of topics that answer broader research questions such as Digital Transformation, Data Strategy, and Data centralisation implementation. Prior to data collection, the interview guide underwent review by the supervisor to verify the validity and effectiveness of the questions. While an interview guide served as the framework, adjustments were made to questions when participants addressed multiple inquiries within a single response. Furthermore, modifications were implemented in wording to ensure clarity and comprehension among participants based on the bank, business unit, tenure, and seniority. For instance, executives were probed and questioned on strategy rather than technical questions. Furthermore, participants interviewed from the third interview were asked questions based on previous interviews.

Given that hybrid working models existed post-COVID-19 across multiple banks, this method selected virtual video conferences. The virtual video format of the interviews facilitated clarification and further probing to elicit additional information when deemed necessary. Participants were asked to provide their consent for both interview participation and interview recording. Participants read the participation form before starting to ensure they understood confidentiality and the ability to opt not to answer questions they felt uncomfortable with. Throughout the interview process, responses were captured using an automated transcription. Notably, one participant requested to review the questions beforehand to ensure that they were comfortable to take the interview, whereas the remainder of the participants were presented with the questions during the interview session.

Semi-structured interviews (Adams, 2015) play a pivotal role in qualitative research, facilitating a comprehensive examination of the participants; advantages include: (1) examining sensitive issues deeply, (2) conducting direct

discussions with key stakeholders for preliminary assessments, and (3) investigating new or undefined subjects where adjusting questions is essential. Their ability to adapt to a wide range of participants is useful in the context of this study. According to (Adams, 2015) semi-structured interviews also have disadvantages: (1) they require a lot of time and effort, demanding significant resources (2) their success greatly relies on the interviewer's skills, including their ability to empathize, adapt, and understand deep insights during the interview (3) they are hard to use for large-scale studies (4) analysing the data from these interviews is complex and requires a detailed examination of notes and transcripts to find meaningful information.

3.4.1 *Population*

The banking industry is broad in South Africa, with a combination of South African and international banks. Given the time constraint to conduct research, the population consisted of three of the top five largest banks in South Africa, particularly within the retail banking sector. The top five banks are undergoing a digital transformation and will likely encounter issues with data centralisation.

3.4.2 *Sample and Sampling Method*

The researcher used the purposive sampling method, part of the non-probability sampling method. This method refers to a selection of individuals who meet a specific criterion (Andrade, 2021). The method was selected due to the researcher's knowledge of the banking industry, experience facilitating digital transformations, and, thus, the issues faced in the industry. In addition, the time constraints to complete the study was a key consideration. The participants were selected based on seniority, exposure to the research topic on data centralisation as a key enabler of digital transformation in South African retail banks, and their experience in strategy formulation and implementation within the retail bank.

The sample for at least two banks will include executives, senior management, management, and junior management (see Table 3-1).

Table 3-1: Profile of proposed respondents

Respondents in Retail banking divisions(Everyday banking, Business banking, Vehicle Finance, Home Finance)	Respondent	Number to be sampled
	Executive management (Chief Information Officer, Chief Digital Offer)	3
	Senior management (Head of departments)	7
	Junior management (operational leads handling data)	5
	Total:	**15**

3.5 THE RESEARCH INSTRUMENT

The research instrument that was used for this research was in the form of face-to-face interviews (Armstrong, 2019). Given the constraints of the hybrid work model across all banks for the researcher to meet face-to-face, virtual interviews were conducted. The interview questionnaire was explained to the participants, and they were allowed to ask questions before commencing the interview. The interview questionnaire had questions placed in a bucket of themes that answered broader research questions such as Digital Transformation, Data Strategy, and Data centralisation implementation. The interview questionnaire is found in Appendix A.

3.6 PROCEDURE FOR DATA COLLECTION

The researcher used one of two methods to approach the bank participants: reaching out directly to the identified sample or reaching out to the HR managers. The interviews were conducted virtually due to a hybrid working model across all banks. The steps followed for the direct participant approach (ideal approach) were as follows:

1. A sample based on each Retail bank was identified. The sample was based on the true participants' profiles (executives, middle management, junior management) (see Table 2). Furthermore, tenured participants (i.e., not new to the bank employees) were selected.

2. The researcher sent a participation information sheet explaining the research intention, interview process, and rules and asking for permission to participate. If the participant agreed, a consent letter was sent for signature. Proposed interview dates were also sent.

3. The researcher started by setting context, setting ground rules, and answering questions during each interview session.

3.7 DATA ANALYSIS AND INTERPRETATION

The researcher analysed data using thematic analysis. The method of analysis and interpretation helps the researcher conclude a well-structured and organised report (Cassell & Symon, 2004). The analysis is a six-step process.

The thematic analysis process was followed by the researcher as follows:

1. Familiarity with data

The researcher assessed the data integrity and destroyed personal data from the participants to respect anonymity. The interview recordings were transcribed on Microsoft Teams (Braun & Clarke, 2006).

2. Generalisation of initial codes

   The researcher identified interests and themes from the codes. NVivo software was used to formulate the initial codes for the qualitative data.

3. Identification of themes

   The researcher grouped themes from the codes. The codes were grouped into categories.

4. Reviewing of themes

   The researcher refined and analysed the themes. The categories were refined, renamed, combined as themes, and highlighted using colour coding.

5. Definition of themes

   The researcher identified and defined themes. The themes were finalised, and a thematic map was defined to indicate the linkages among themes.

6. Writing of report

   The researcher created a storyline to report findings based on patterns and themes inference. A report of findings was conducted and can be found in Chapter 4.

3.8 TRANSFERABILITY, CREDIBILITY, AND DEPENDABILITY

3.8.1 *Transferability*

The study was conducted across the top five banks, focusing on at least two. That was a good starting benchmark for transferring the findings to other retail banks in South Africa or similar developing markets that are dealing with similar issues. Transferability is defined as how well qualitative research outcomes can be used or modified for use in various environments or with diverse groups of people (Lincoln & Guba, 1985). The researcher is responsible for enabling potential users to assess the transferability of the results by providing detailed and rich descriptions. The study ensured that findings were adaptable for various contexts rather than presuming they would universally apply. This was achieved through in-depth descriptions, enabling others to assess how these insights could be applied within specific circumstances.

3.8.2 *Credibility*

As part of the quantitative methodology, in-depth interviews were conducted to ensure that every part of the research questions were answered. The interview questions will be inspired by published research to ensure that the relevant questions are asked. Furthermore, the researcher took notes and recorded the interviews to ensure that no details were missed. Credibility refers to the trustworthiness and believability of research findings. It determines if the conclusions drawn truly reflect the data provided by participants and accurately represent their original perspectives (Lincoln & Guba, 1985). To ensure credibility in the research, multiple participants from the same organisation were interviewed, allowing for a comprehensive capture of diverse perspectives and enabling cross-verification of data. Guaranteeing participant anonymity encouraged genuine openness, significantly enriching the findings with authentic insights.

3.8.3 *Dependability*

It is critical that the results of the study can be reconstructed. The data was available in digital format to ensure there was an audit trail. Furthermore, the thematic process will ensure that steps are documented to display how the researcher got to their results. Dependability is the stability and reliability of research findings across time. This concept requires that the study's conclusions, interpretations, and suggested actions are validated by participants, confirming that all aspects are backed by data obtained from those involved in the research (Lincoln & Guba, 1985). In the context of the research, to provide an accurate and verbatim account of the participants' responses, interviews were recorded, reducing the risk of misinterpretation or loss of data that can occur with notetaking alone.

3.9 ETHICAL CONSIDERATIONS

The researcher will take the following steps to ensure that the research is ethical:

- The researcher will only research once an Ethics clearance certificate is issued from the University of Witwatersrand (Appendix C) to ensure the validity of the research.

- Where necessary, the researcher sends a formal letter and email to HR to ask permission to conduct research with a few employees in the banks.
- The researcher will share the participation information form with the participants.
- The researcher will share and store a signed Consent Agreement form.
- The research will follow up on all necessary meetings with participants by email to ensure that there is a trail.

- The researcher will not share the names of the banks or sensitive data from the participants.
- The researcher will explain the process at the beginning of every interview and allow respondents to ask questions to ensure no misunderstanding.
- The researcher will make it clear to the participants that there will be no payment or favours made for participation in the study.

Chapter 4: FINDINGS

4.1 INTRODUCTION

In this chapter, the findings from the qualitative research are presented according to the analysis method outlined in the previous chapter. This chapter begins with a presentation of the banks' background and the research participants. For anonymity, participants' names were excluded, and banks are referred to as Bank X, Bank Y and Bank Z. The findings presented in this section reflect the emerging themes from participant feedback. The analysis was conducted using the thematic approach outlined in section 3.7 of this report. The findings are outlined using this analysis method relative to the propositions presented in Chapter 2.

4.2. BACKGROUND INFORMATION

4.2.1. BACKGROUND ON RETAIL BANKS

The research was conducted with three of the top traditional retail banks in South Africa that are undergoing a digital transformation. The banks are conventional banking institutions that have started adopting areas of digital banking. The institutions have been in South Africa since the 1800s and have a presence within the rest of Africa. The banks offer segmentation services such as retail banking, corporate investment banking, and so on. This research focused on Retail Banking, which focuses on mass individual customers and small-sized enterprises (SMEs). It is pivotal that the mass customers receive adequate customer experience and digitised services.

Figure 4.1 presents a high-level depiction of one of the Banks, with the most participants and most common structure.

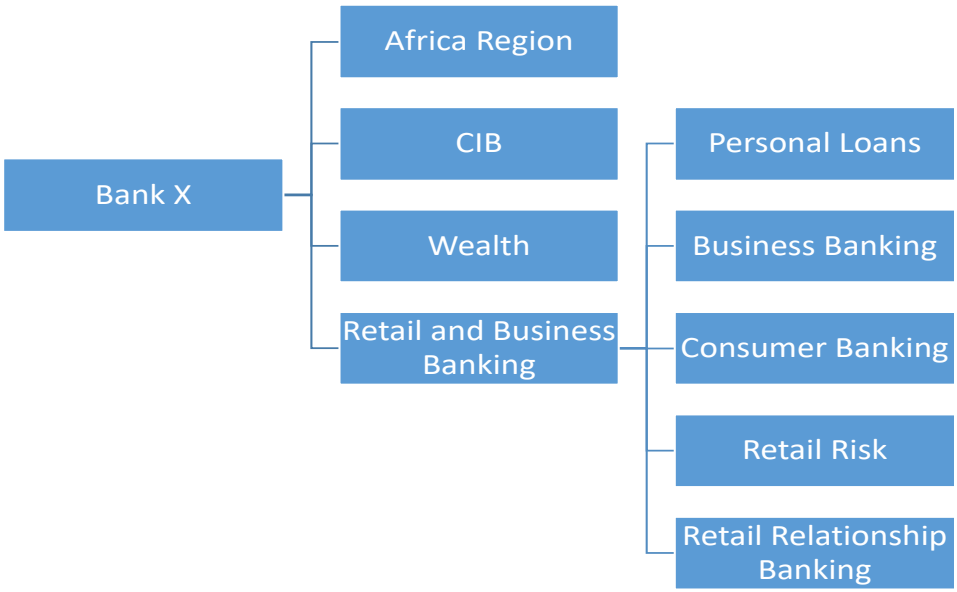

Figure 4-0-1 : High-level organisation structure of Bank X Retail Banking

Bank X retail bank comprises the following key business units: Transactional banking, Vehicle finance, Home loans, Finance, and Compliance. The Retail and Business bank segment has an executive leadership pillar, which includes a CEO, CIO, CDO, COO, and CRO. The CxO leadership is supported by senior management and middle management. Although the retail and business banking segments have similar objectives in serving mass consumers, business banking as a division has its own dedicated function for data management.

4.2.2. BACKGROUND ON PARTICIPANTS

This section presents background information on the participants from the case organisations. Due to the busy schedules and some banks' hybrid models, the interviews were conducted virtually using Microsoft Teams. In line with the sampling stated in Chapter 3, the participants were selected based on their roles, experience, and exposure to the research topic. The participants underwent a digital transformation and were exposed to data use in their roles. To adhere to anonymity, the case organisations are referred to as Bank X, Bank Y and Bank Z, and the participants are referred to as Participant 1, Participant 2, and so forth.

Table 4-1 below displays demographic details about the participants. It can be observed that participants are in executive, middle and senior management roles and have been exposed to strategy and implementation of digital work within the organisations. It can be noted that many of the participants had a postgraduate degree, including master's degrees. It can be seen that the participants were experienced with an average retail banking experience tenure of ten years, indicating a young, middle-aged, and innovative leadership participant group, which provides extensive knowledge of the South African retail bank for this research. In addition, the participants had an average of twelve years of working experience, indicating a young and innovative leadership participant group, which provides extensive knowledge of the South African corporate environment for this research. In line with Chapter 3, the participants played senior and middle management roles within the technology function, such as Senior business manager, Product manager, Data science lead, Engineering and Platform manager, and so forth. All the participants had experience working in more than one financial institution and different functions within retail banking, which indicates multi-dimensional thinking. Due to the unavailability of executive roles meant to participate, there were limitations to including more than one executive participant in the research. However, patterns were identified from the

participants who managed to proceed with the research interviews.

Table 4-1: Participant information

Participant	Gender	Age	Highest Qualification	Work experience	Role	Banking Tenure
Participant 1	M	33	Postgraduate	11	Senior management	10
Participant 2	M	29	Undergraduate	7	Middle management	5
Participant 3	F	34	Postgraduate	13	Senior management	13
Participant 4	M	35	Postgraduate	14	Senior management	12
Participant 5	F	30	Postgraduate	8	Senior management	8
Participant 6	M	40	Postgraduate	18	Executive	15
Participant 7	F	41	Postgraduate	19	Executive	5

4.3 RESEARCH QUESTIONS

The research aimed to establish aspects of how a digital strategy supports a data strategy in a digital transformation. Furthermore, it aimed to establish the inhibitors that enable the implementation of data centralisation.

The aim of the research was collapsed into key research questions:

6.1. How does digital strategy and culture impact the implementation of a data-driven retail bank during a digital transformation?

6.2. Which aspects are inhibitors of implementing data centralisation, and how do technology and architecture impact the implementation of data centralisation?

4.4. RESEARCH PROPOSITIONS

The research propositions are derived from Chapter 2 of the conclusion of the Literature review as follows:

Digital transformation along with digital technologies and capabilities have the ability to disrupt the banking industry. In order to be successful, it is necessary that a digital strategy is defined, and that top executive are involved in role modelling the culture change in the implementation of digital transformation.

Data must be centralised in order to make good business decisions. Amidst the challenges, South African banks need to follow suit like banks all over the world by prioritising data strategies within digital transformations to ensure that they maximise on achieving a successful business strategy.

4.5 THEME DEVELOPMENT

The analysis was conducted using the thematic analysis process, employed during the quantitative data analysis discussed in Chapter 3. The thematic process is depicted in Figure 4-2 (Braun & Clarke, 2006) below.

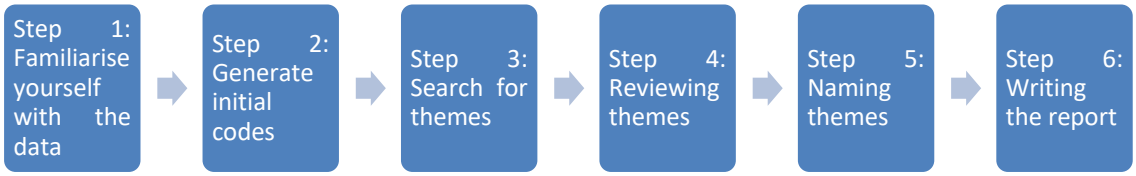

Figure 4-0-2 : Thematic analysis

4.5.1 FAMILIARITY WITH DATA

Data was collected through Microsoft Teams meetings, creating audio conversation transcripts. The transcripts were in text format to allow analysis of the data. The data was cleaned to ensure words captured incorrectly were corrected and to omit personal information mentioned during the interview, such as the participant's name or the case organisation's name. A read-through of the data was conducted, and initial impressions were identified based on research questions and have been synthesised as below.

a. Initial impressions: How does digital strategy and culture affect the implementation of becoming a data-driven retail bank during a digital transformation?

The banks all have digital transformations taking place, and each is at different stages of the digital transformation. The common vision of the banks was to become banking leaders in digital and innovation, and this is mandated at the CEO level. There is a clear objective amongst the banks to compete to become customer centric to have a competitive advantage. Executive leaderships are expected to communicate the digital strategy to senior and middle management to ensure learning and adoption occur. There is a vision that there must be a change in process and culture to see the transformation through in next five years and the rest of the roadmap. There is an acknowledgement that the improved data strategy can play a role in driving a data-driven organisation. Digital and data maturity is still low and not at the level the business would wish to have.

b. Initial impression: Which aspects are inhibitors of implementing data centralisation, and how do technology and architecture impact the implementation of data centralisation?

There is a strong sense that the banks have not reached the full potential of using data effectively across the retail bank, and this is due to the lack of data centralisation. There are several challenges the banks are experiencing that hinder data centralisation; these vary from ways of working to technologies. There is a vague data strategy in place; however, initiatives to implement it are not rigorously followed, indicating a gap in implementation. The senior and middle management are unclear on how data use cases are connected to key business objectives and KPIs. Innovative data technologies are implemented in a few of the case organisations. The majority of the banks' divisions and departments work in isolation, causing duplicates and inconsistent data across the retail bank. Modern data skill sets in banks exist, and for the banks that did have the roles, the middle management did not know how to work with colleagues. There was a clear desire from the participants that data management and data strategy

required drastic improvement to ensure that the banks have data centralised to become data-driven to support a digital transformation. Critical decisions are required on the current architecture to ensure the strategy's success.

4.5.2 GENERATION OF INITIAL CODES

The initial codes were generated using the research questions as guidelines. Open coding was applied as there were no predefined codes beforehand to ensure that this was in line with the inductive approach. Atlas.ti software was used in the thematic process to generate codes and identify themes. The tool was selected due to its ability to display the density and groundedness of codes. Groundedness is important for qualitative research because it measures the number of times a code is applied to a data set. Table 4-2 reflects initial codes generated in line with research questions.

Table 4-2: Initial codes

Research question 1	Groundedness	Research question 2	Groundedness
Culture	32	Data management	94
Accountability	1	Data access	47
Hierarchical	6	Data integration	11
Mindset	5	Data quality	20
MVP	2	Data warehouse	12
Ownership	8	Decentralised	30
Release frequency	2	Structured data	1
Resistance	11	Unstructured data	1
Speed to launch	7	Data governance	26
Leadership	29	Data charter	1
Digital champion	6	Data compliance	12
Empowered colleagues	1	Data operations	1
Strategic direction	13	Data signoffs	1
Transformation initiatives	12	Data stewardship	14
Learning organisation	20	Governance	2

Agile practice	3	POPIA incorporation	1
Training	17	Security and regulation	26
Shared vision	31	Regulation	26
Business vision	17	Operating model	20
Buy-in	4	Data structured organisation	6
Data strategy implementation	6	Chief Data officer	6
KPI	7	Data team	10
Metric	1	Infrastructure and Architecture	39
Silo organisation	24	Data lake	1
		Data models	7
		Data technologies	20
		Legacy systems	17
		Data strategy	25
		Data-driven decision making	19
		Analytics and insights	8
		Data driven decision	11
		Data centralisation benefits	5
		Cross function collaboration	5
		Challenges	45
		Cost	4
		Data roles	2
		Data scientist	2
		Data skills	12
		Silo organisation	24
		User experience and interactions	11

From the initial coding process conducted, there were 63 open codes and groundedness identified against the research questions. Thereafter, there were similarities identified in the codes which were grouped to form a list of categories.

Table 4-3 below reflects the synthesized list of categories and groundedness of each category as a code. There was a total of 15 categories summarized of which 4 were associated to research questions one, and 11 were associated to research questions two. The categories were summarized to ensure that there are minimal duplicates, however these could further be summarised to for identify patterns and themes.

Table 4-3: Categories identified

Category	
Research question 1	**Research question 2**
Culture	Data management
Leadership	Data governance
Learning organisation	Security and regulation
Shared vision	Operating model
Digital strategy	Data structured organisation
	Infrastructure and Architecture
	Data strategy
	Data-driven decision making
	Challenges
	Customer centricity

4.5.3 IDENTIFICATION OF THEMES

A review of the categories was conducted to identify themes. Key patterns were identified amongst the initial list of codes and categories. It was observed that some categories had lower groundedness which could be combined into common themes.

Table 4-4: Identification of Themes

Themes			
Research question 1	**Groundedness**	**Research question 2**	**Groundedness**
Leadership	61	Operating model	78
Culture	114	Data management	326
Digital strategy	90	Architecture and technologies	84
		Data strategy	73
		Challenges	65

4.5.4 REVIEWING AND FINALISING THEMES

The themes were reviewed in line with the research question and the 15 categories were classified into 5 themes. Table 4-5 reflects the final themes identified. The prevalence of each theme was considered in the determination of each theme. The final identified themes were (1) Digital strategy (2) Culture (3) Operating model (4) Data management (5) Architecture and technology.

Table 4-5: Final themes

Themes	
Research question 1	**Research question 2**
Data Strategy	Operating model
Culture	Data management
	Architecture & technologies

A thematic map indicates the relationships between the identified themes as illustrated in Figure 4-3.

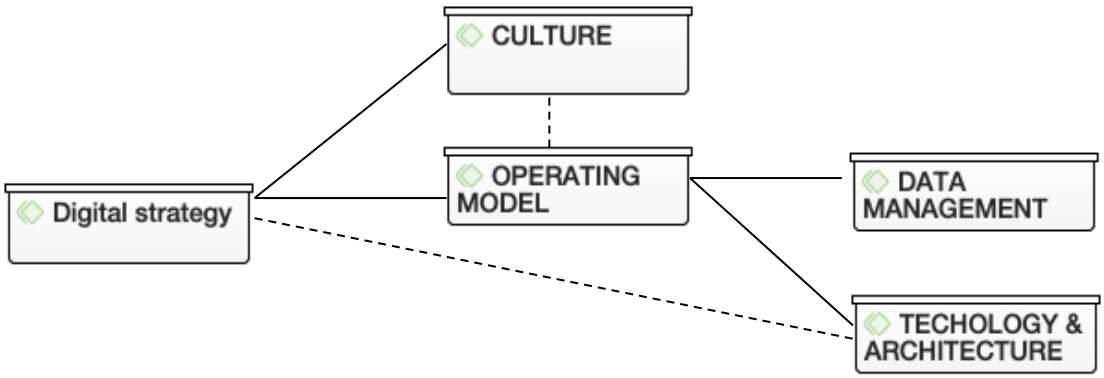

Figure 4-3: Thematic map

4.6 FINDINGS IN RELATION TO PROPOSTION 1

Digital transformation, along with data strategy and capabilities, has the ability to disrupt the banking industry. In order to be successful, it is necessary that a digital strategy is defined and that top executives are involved in role modelling the culture change in the implementation of digital transformation.

In order to test the proposition, the findings from the interviews conducted were analysed using the thematic analysis. The research instrument defined in Chapter 3 outlined questions about leadership and cultural impact on digital during a digital transformation.

4.6.1 DIGITAL STRATEGY

The research instrument did not explicitly test for the definition of a digital strategy, but the understanding of elements that impact digital strategy in the retail banks emerged in the participant's responses. There were patterns that formed themes, which included Leadership, Data strategy, Shared vision, and Customer centricity. It was observed that across all case organisations, a digital strategy was formulated by the technology executive leadership in line with the business objectives. Leadership modelling adoption to the digital change was observed at one bank, Bank Y, where the CEO played an active role in being a “digital champion”. It was acknowledged that a data champion was not well represented towards becoming a data-driven organisation.

Leadership buy-in was not consistent across the banks, as one bank executive, described by participant 3, had buy-in and the rest of the banks had political constraints which required buy-in.

> "*The bank CEO was always able to just buy get buy in from the employees and executives. The way he's such a good leader, he was able to get the employees focused on building the towards the vision*" – Participant 3

As described by participant 4, there is acknowledgement from senior management to have a data strategy within the digital transformation to help drive key business objectives such as the growth of bank products as a bank strategy.

> *" The strategic leveraging of data to grow products is the main objective and driver of really having a good data strategy*" – Participant 4

The banks are prioritising customer centricity as part of their digital strategy, and this is especially true with an outlook of digitalisation.

> " *The main objective from a business perspective is that they obviously want to become a much more customer centric company that to some extent will be digitized*" – Participant 1

Furthermore, as observed by participants 1 and 6, banks are using on-premise systems and would like to support the shared vision of customer centricity by introducing digital technologies such as the Cloud. New vendors would need to undergo an assessment to be onboarded.

> "*We want to drive future fit technologies and we try to align to the customer centric mindsets, that is the company's broader objective*" – Participant 1

" There has been an aim in improving customer experience and operational efficiency. By that meaning, we have been adopting different technologies within the bank" – Participant 6

4.6.2. CULTURE

Digital transformation has an impact on the culture of the case organisations within retail banking and other divisions. The key patterns that were noted under the Culture theme from the participants' responses were learning organisation and resistance to change. Culture impacts the success of the implementation of a digital transformation; it is pivotal that as the banks go through change, the culture does not become counterproductive. The culture described by respondents in all banks was hierarchical.

> "*The culture is hierarchical. The culture is a bureaucracy way of doing things"* – Participant 5

Responses from participants indicate that majority of the banks aims to introduce training as means to support change. The trainings were identified for those who were required to operate new systems such as developers, call centre agents and branch staff. In one bank, the training was exclusively offered to the teams that were the first movers to the transformation. There was a clear gap in the banks around trainings offered and applying the new skills acquired to legacy systems, as noted in participant 5's response.

> "At the end of the day, it is individual responsibility for the developers to upskill. There was an opportunity that people can start getting certifications" – Participant 2

> "*Yes, we've got the certifications, but now we're building from scratch from working with legacy systems. So, there's still that gap* "- Participant 5

While the adoption of a digital transformation and data strategy implementation indicated redundancy in roles such as call centre agents which were replaced by RPA, there was a sense of fear in colleagues to feel replaced or made redundant.

> *"There was a lot of fear for structural change because now certain roles weren't there. Some colleagues had the skills and capacity, and some didn't operate in this new way and structure, especially from the traditional bank side"* – Participant 4

There was no consistency observed from respondents on resistance to adoption, due to the change management and transformation being handled differently, across segments and business units. Participant 3 describes resistance and adoption towards the data engine implementation within their business unit as manageable.

> "*In my team, I support it because we're the data team, it wasn't too difficult to convince us. But the rest of the bank was more resistant"* - Participant 3

The mindset of resistance and slowness to change was within Business units and functions. Participant 5 describes the culture was often reactive and not proactive.

> *"We're only just starting, so it's very reactive and I think sometimes it's also very political, you know, because it's always about what is this leader doing from this segment. It feels political"* – Participant 5

4.7 RESULTS TO PROPOSITION 2

Data must be centralised in order to make good business decisions. Amidst the challenges, South African banks need to follow suit like banks all over the world by prioritising data strategies within digital transformations to ensure that they maximise on achieving a successful business strategy. In order to test the proposition, the findings from the interviews conducted were analysed using the

thematic analysis. The research instrument defined in Chapter 3 outlined questions around inhibitors of data centralisation during a digital transformation.

4.7.1 OPERATING MODEL

The operating model is one of the key factors that inhibit data centralisation in all the case organisations. In all three case organisations, the business units or segments within retail banking somewhat worked in silos. It was noted that barriers were created, and each business unit or segment had its own data, systems, and process to access the data. Regarding data leadership, Bank X and Bank Y had no Chief Digital officer (CDO) within each business unit, while that Bank Z had a CDO. In Bank X and Y, each business unit or segments collaborate data initiatives with group executives. Furthermore, it is noted that the lack of direct CDO is negatively impacting Bank Y's operating model, according to participant 3.

> "We have a Chief Data officer at the bank "- Participant 3

> "The bank thinks what works is having a CIO. I believe a CIO and the CDO are two different offices because the information area in the CIO could deal with the types of technology we have. And then the CDO would specifically look at data because there's just so much from a data perspective that needs to be reviewed "– Participant 3

Data ownership was noted to be owned within each business unit across all retail banks. It was a consistent theme that data was owned by a team, which posed both positive experiences and challenges. It is unclear how to get access to data. Bank Y, had a data steward at segment level dedicated to data ownership and access of the decentralised systems, as described by participant 5.

> “And within that particular data team, there will be certain data stewards or data management specialists that would manage that database or would manage that system “- Participant 5

Regarding the data team, Bank Z is observed to be ahead of ensuring there is a data executive and a dedicated data team within the business unit. It was noted that Bank X and Y are currently building a central warehouse, however, first point of access for data is the decentralised system because it is easier to access. The warehouse is not matured and enriched with relevant data yet.

4.7.2 DATA MANAGEMENT

Data management is directly impacted by the operating model in case it is siloed and decentralised. Data management and governance challenges impact data centralisation which is the key goal to driving a data driven organisation. It is noted that data governance, data quality, data security and maintenance are key patterns and sub-themes formed for all case organisations. It is noted across all case organisations that when data is decentralised a robust data governance framework was not in place and the lack of governance has created loopholes as all business units follow different governance. Participants reflected on POPIA as an example of how it had to be implemented by several teams instead of one when it was introduced. All participants reflected that decentralised data caused data quality issues due to inconsistencies, redundant data, and inaccurate data. There was a general concern with the customer’s information being stored as several versions across business units and segments. This goes against the objective of being customer centric. Participant 2 describes an example of how it impacts subsidiaries.

> “We have multiple subsidiaries. Let's say you have a client and in one of the subsidiaries of the products, the person updates the address. It means now they must also call the other subsidiaries and update the address for all those products that they're using. There is an unpleasant experience and you're going to be duplicating work “– Participant 2

Data access and security are observed to be the largest issue with data decentralisation from the participants. Although Bank Z had a dedicated data team and CDO, access and security were not in a good place, for instance, test data posed a security risk internally.

> “So, because of that whole decentralised way that we manage the data, it then becomes difficult for teams to actually know what already exists and how they can leverage or create value from the data that already exists within the organisation “– Participant 1

> “To be honest, the way data was readily available. It was sort of a risk because when we were testing things to go live with. Data was just there, and we could use whatever data without necessarily taking the governance into perspective. So, it was risky to have data lying around like that “– Participant 3

It was noted that for Bank X, there was a recent database that was centralised, however, access was flagged as an issue too.

> “The new centralised database access to the data and getting access to store data with them is a very strenuous process in the sense that there are multiple levels of governance “– Participant 1

4.7.3 ARCHITECTURE & TECHNOLOGIES

The architecture and technologies are directly influenced by the data management in place in the organisation. Based on the participants response

architecture and technologies selected have been inhibitors of data centralisation.

An integrated one customer view of the user is currently impossible for any of the banks, there is however a full view of the customer at business unit-level. The level of data is something that participants wished the banks could source. Currently, it's observed that all case organisations have Legacy systems in place. Attractive technologies to support data centralisation can be sourced as part of the transformation such as the cloud solution data lakes. Participants noted that there is cost associated with decentralised data and continuing to keep legacy systems whist there are better solutions is outdated.

> "We can't really adapt with the legacy systems you have in place so. It's costly. "- Participant 2

> "So, we have been in the last seven years on that journey to decommission all the legacy systems. You're trying to migrate across and then switch off all the legacy stuff because you're paying double cost now to have the legacy and the new systems and platforms running in parallel" – Participant 7

Integration to new data technologies as such is proving to be impossible for both centralised and decentralised data systems due to the difference in coding language and inflexible and outdated nature of legacy systems. Bank Y is described by participant 5 to experience this.

> "Codebase is actually legacy, and you know that is disadvantageous when it came to trying to do machine learning or you want to adopt some new technologies "– Participant 3

It has been noted, from participant 6 executive, that there is a concern on data roles and skills working efficiently on legacy systems.

“Some of the challenges that we are facing is there are skills gaps in terms of understanding the way that specific data works“– Participant 6

CHAPTER 5: DISCUSSION

5.1 INTRODUCTION

This chapter serves as interpretation of the results presented in Chapter 4 and considers the theoretical literature review. From the analysis conducted, Table 5-1 reiterates the themes that were formulated relative to the research questions and propositions.

Table 5-1: Study research questions, propositions and final themes

Research question	Proposition	Themes
How does digital strategy and culture affect the implementation of becoming a data-driven retail bank during a digital transformation?	Digital transformation along with data strategy and capabilities have the ability to disrupt the banking industry. In order to be successful, it is necessary that a digital strategy is defined and that top executive are involved in role modelling the culture change in the implementation of digital transformation	Digital strategy
		Culture

Which aspects are inhibitors of implementing data centralisation and how does technology and architecture impact implementation of data centralisation?	Data must be centralised in order to make good business decisions. Amidst the challenges, South African banks need to follow suit like banks all over the world by prioritising data strategies within digital transformations to ensure that they maximise on achieving a successful business strategy	Operating model
		Data management
		Architecture and Technology

5.2. DISCUSSION PERTAINING TO PROPOSITION 1

Digital transformation along with data strategy and capabilities have the ability to disrupt the banking industry. In order to be successful, it is necessary that a digital strategy is defined, and that top executive are involved in role modelling the culture change in the implementation of digital transformation.

This section provides the discussion on themes identified in relation to proposition 1 stated above.

5.2.1 Digital strategy

According to Wade's (2017) digital vortex analogy, the Financial Services industry is one of the top four disruptive industries in digital innovation. The results are aligned with this literature as all three banks in the case were observed to have a similar vision, to global banks, to become the best digital bank. It was found to have vision to explore innovation. With the rise of retail banks moving towards digitisation to become data and customer centric, digital strategy was a priority for the three banks to stay competitive in the market. According to (Wade 2017) the digital vortex indicates the banks have the highest innovation potential. Based on the data collected, it indicated that across all retail banks the digital strategy was formulated by technology executives at group level. The digital strategy was handed off to subsidiaries, segments, and business units. It was observed that the approach to formulation was top down. This highlights that there is a gap in the digital strategy curation as it is not inclusive. The implication of misaligned strategy is that it leads to a lack of shared vision amongst segment business executives and the supporting management.

According to the digital culture framework, stated in Chapter 2 of the literature review, autonomy allows people at all levels to get involved in contributing to key decisions. The findings indicate that there was an objective to become data centric, however the data strategy was not highest priority in the overall digital transformation. This confirms that in order to unlock customer centricity and become data centralised, it is key that a data strategy is prioritised and formulated with all necessary executive and business leaders. Therefore, the retail banks require improvement in digital strategy inclusivity, leadership collaboration and data strategy prioritisation in accordance with literature. Key stakeholder identification and involvement across all retail banks is required.

While strategy is imperative part of a digital transformation, it is necessary to ensure that the retail bank digital and data maturity is par with the initiatives the leadership would like to drive. Digital maturity refers to the integration of digital technologies in transforming how organisation's work (Kane et al., 2015). In line with literature, Bank X and Bank Z slowly integrated new technologies and ways of working whilst the maturity was low, for instance, Bank X conducted the transformation in isolation to a business unit before they integrated to the rest of the retail bank. Based on the participants feedback, Bank Y's data maturity and digital maturity was low whilst they brought in skills such as data scientists. For successful transformation to become data driven retail banks, digital and data maturity assessment needs to be conducted as part of strategy formulation.

However, the formulation of the digital strategy is formed in isolation by the technology executives without involvement of the executives of business units that are impacted by the digital strategy implementation. Concerns around capacity, ownership and implementation of the digital strategy surfaced from non-technology executive leadership. It was observed that there was a disconnect on implementing the digital strategy due to lack of collaboration, senior and middle management of business units felt disconnected to the digital strategy.

5.2.2 Culture

To adopt a digital culture, it is important for the organisation to learn continuously. According to Göhlich et al. (2018), learning is achieved through three principles: individual learning, community learning, and learning from the organisation. To an extent, the study findings corroborate this for the three banks. Participants indicated that individual learning was provided on voluntary and mandatory basis. For Bank X, a participant mentioned that HR would derive trainings based on digital roles and tenure. This illustrates that there was an effort from the change management teams to ensure that learning and adoption is taking place.

From the participant responses, there was more focus on training for the colleagues that were in technology or undergoing change such as branches. This finding indicates that there is missed opportunity to educate the rest of retail banking business and functions that are impacted so that they are familiar with transformation. It is noted from participants that educating colleagues from Business would ease their work as a Technology team. Learning programme about tools and ways of working as optional for all colleagues should be a consideration for the retail banks.

According to theoretical framework stated in Chapter 2 of the literature review, Westerman et al. (2019) describes that openness is engaging broadly with diverse sources of information and insights. From this statement, it is key that leaders actively address resistance by fostering a culture of openness, communication, and training. The results from participants indicate training was provided to tackle resisting culture and prepare colleagues for change at all retail banks.

Organisations as bureaucratic as banks are built on cumbersome organisational rules and governance which poses a challenge to implement a digital transformation. Westerman's framework is based on four key values of digital culture for traditional organisations: impact, speed, openness, autonomy (Westerman et al., 2019). Autonomy enables employees to feel safe, co-create ideas, and problem-solve, the findings for Bank Z confirm this literature as the participants mentioned the CEO collaborating and asking ideas from all colleagues regardless of their role and tenure. Bank X and Bank Y is observed to not be autonomous based on hierarchy and top-down culture, participant from Bank Y described the retail bank as bureaucratic and very hierarchical.

Training is often a productive approach to ensure that the organisation adapts to new ways of working and observes material about change, culture, and initiatives, however role modelling is another powerful approach. In order for the retail banks to further encourage an autonomous environment, leadership needs to be the key digital champions and spearhead the digital strategy and initiatives. Literature

suggests that a digital strategy is championed by a leader called a CDO and ensures that it is implemented accordingly during a digital transformation (Rickards et al., 2018). The results indicate that digital champions need to be formally identified and communicated to the organisations. The findings show that at Bank Y, there is a different approach on the digital champions role, which is led by the engineering team. This illustrates that digital champions need to be formally identified and communicated to the retail bank colleagues so that there is the right level of buy-in on initiatives and the transformation.

5.3 DISCUSSION PERTAINING TO PROPOSITION 2

Data must be centralised in order to make good business decisions. Amidst the challenges, South African banks need to follow suit like banks all over the world by prioritising data strategies within digital transformations to ensure that they maximise on achieving a successful business strategy. This section provides the discussion on themes identified in relation to proposition 2 stated above.

5.3.1 Operating model

Literature states that a digital strategy is championed by a leader called a Chief Digital Officer (CDO) and ensures that it is implemented accordingly during a digital transformation (Rickards et al., 2018). This suggest that this role should not be seen as a replacement of other key technical executives' role such as Chief Information Offer or Chief Data Officer as capabilities are different. In order become data-driven and centralised retail bank that can implement a successful data strategy, a CDO requires support a dedicated Chief Data officer.

Research performed by (Schilling et al., 2020) showed the establishment of a CDO organisation is crucial for providing data governance and advancing data-driven innovation within enterprises. However, the participant results contradict the above literature in that only one out of the three case organisations had a

dedicated Chief Data Officer for retail banking, the role was often played by a Chief information or Chief digital officer. The implication of an undesignated Chief Data officer creates a lack of centralised leadership and direction in driving data initiatives, which can inhibit the bank's ability to leverage data effectively for strategic decision-making, innovation, technology adoption, data governance and cross business collaboration.

Participants indicated that the introduction of a Chief Data officer would remove the silos experienced in Bank X and Bank Y. Based on research (by Zhao and Kamioka (2022)) CDOs require a dedicated team, with roles such as data scientists, to effectively manage and leverage data as a strategic asset. This suggests that indeed a CDO, dedicated data team and data stewards can take ownership of the data governance and ensuring that data is centralised in the retail banks. In line with Westerman's framework (Westerman et al., 2019), this new operating model that can drive openness and autonomy is required in the bank and be driven by the Chief Data officer.

In line with the participant findings above, the Data Science Hierarchy of Needs framework (Rogati, 2017) from literature review (Figure 2.3) should be adopted to address operating model issues and gaps as it can be used to strategically address the identified gap in data skills and roles within an organisation by advocating for the inclusion of specific positions such as a Chief Data Officer (CDO) and dedicated data scientists. This ensures foundational data literacy and management capabilities are established, facilitating a seamless progression through the hierarchy's levels towards advanced predictive technology, thereby aligning workforce skills with the intricate requirements of sophisticated data processing and analysis tasks.

5.3.2 Data management

Digital maturity determines how mature an organisation can perform on a digital maturity model. Digital maturity refers to the integration of digital technologies in transforming how organisations work (Kane et al., 2015). The majority of retail banks are on their digital transformation journey and aiming to become data-driven. A data maturity assessment is used to assess a bank's readiness to use its data; this provides an adequate perspective of how mature they are using data. Given that the banks want to move to transition to a data-driven organisation, an assessment can be done. It is observed that an assessment by the banks has not been conducted for two of the banks yet. Data maturity assessment was not conducted in this research. However, a ballpark indication of readiness across all case organisations based on the research was low. This is considering data is decentralised, causing the retail banks to be reactive.

Data management is at the core of enabling data centralisation in a digital transformation. According to Abumandil and Hassan (2016), centralisation facilitates better access and use of high-quality information, essential for making informed decisions. Participants indicated that they were aware of the data centralisation approach, however, it was not implemented within the retail banks. In one case for Bank Z, there were elements of starting to implement it but was not matured yet. Findings from research indicate an issue with data management; the DMBOK framework (Earley et al., 2017) from the literature review, Figure 4, can be applied to address a lack of data centralisation by establishing a comprehensive Data Governance structure that ensures data consistency, quality, and security across an organisation. It emphasizes the importance of designing a unified Data Architecture to support centralised data management, identifying existing data flows and silos for integration. Additionally, the framework advocates for the implementation of Data Integration and Interoperability processes, crucial for facilitating seamless data consolidation and enabling efficient access and decision-making throughout the organisation.

According to source (Dallemule & Thomas, 2017) data is often stored in isolation per division in a decentralised data management source. Participants indicated that data was decentralised and stored in multiple data repositories, this was a common pattern across participants. The above findings tie well with the existing literature. It can be noted that data isolation hinders data centralisation as it impedes the ability to generate insights from a single source of truth, creates redundancy due to multiple sources and increases the complexity of data governance. Defining decision rights and accountabilities: Data governance should clearly define who has the authority to make decisions about data and who is responsible for ensuring compliance with data (Abraham et al., 2019). The findings highlight that data governance improvement is required for Bank X and Bank Y. The key challenges were due to a lack of standardised processes for data quality, accountability structures and data source access documentation. It can be noted that the current approach is not preferred. By having centralised controls, data centralisation will facilitate a robust governance framework to ensure that there are no data security loopholes.

In literature it is seen Spruit and Pietzka (2015) contend that establishing a data maturity model has become imperative to mitigate potential data security risks. This research did not investigate the data maturity of the retail banks; however, data security issues were identified. Findings across all banks indicate that data security issues identified included data breach risk, data fragmentation and test data access. This is consistent with what has been found in research by (Bertino & Sandhu, 2005). Test data managers safeguard data from both external and insider threats, as unauthorized data observation, incorrect data modification, and data unavailability are common categories of security breaches. This confirms that data decentralisation inhibits data security. On the contrary, the implication of data centralisation is that it could have risks such as insider intruder threats and leakage. Intruders may have access to high-value data that is

centralised about a user, invading their privacy and taking advantage of the holistic view.

Findings reflect that all participants experienced that decentralised data was causing data quality issues due to inconsistencies, redundancies, and inaccuracies in data. There was a general concern with the customer's information being stored in several versions across business units and segments. This drives against the objective of being customer-centric. Participants 2 and 4 described an example of how data quality issues were impacting subsidiaries and business units negatively by having multiple sources of truth. The overall findings on issues of data quality are by findings/research reported by (Zhang & Chen, 2019) establishing stringent access controls, and consistently monitoring and auditing the storage systems for any unauthorized access or suspicious activities. Data centralisation combats the issues of multiple sources of truth and inconsistency. To ensure that data quality is maintained, data access should be considered.

Data access control in distributed database storage is a crucial aspect due to the security challenges associated with decentralised data management (Lin et al., 2014; Alston, 2017; Alotaibi, 2019). Findings from Bank Y and Z indicate that data access issues surfaced on decentralised data such as test data access and data custodians access management. The research and findings match. The implication of data access in decentralised sources is that it causes other issues such as data security on access management and test data access, data quality due to inconsistencies, and data governance and compliance such as data privacy and POPIA.

The above findings are directly related to each other and indicate that overall good governance and breaking silos is key to enabling data centralisation.

5.3.3 Architecture and technology

Legacy systems pose a significant obstacle to centralising data due to their outdated architecture, which results in the formation of data silos and hinders the seamless integration of data across an organisation. During the transformation and adoption of new technology, legacy systems are not ideal. Research by (Cao & Iansiti, 2022) states that the intricacy not only hampers the pace of digital transformation but also impacts the organisation's capacity to utilise advanced analytics and machine learning, which are essential for making data-informed decisions.

Research findings indicate that across all three retail banks, legacy systems still existed and formed a part of the core banking systems. The findings and research confirm the implication of data from legacy systems is an inhibitor to data centralisation that it cannot easily integrate into legacy systems, thus inhibiting integration to digital technologies that support data solutions such as cloud-based solutions and big data platforms. The other implication is that it is an inhibitor of scalable architecture as the architecture has constraints to customisation. Furthermore, it is costly as it is high cost to maintain. Findings from executives at Bank Z confirmed that running a legacy system is costly, especially given the migration journey the bank is undergoing.

To centralise data, banks should consider migrating from legacy systems to ensure that existing user data is maintained in better new technology repositories such as the data lake and data warehouse. Findings indicate that some retail banks, such as Bank Y, were far on their journey of data migration to support their data strategy.

5.4 CONCLUSION OF DISCUSSION

Retail banks are embarking on digital transformation with the objective of becoming customer-centric organisations. As part of the digital strategy, a data strategy needs to be prioritised to ensure that there is implementation of the data initiatives and adoption of data technologies. To support the process a digital culture needs to be adopted and driven by leadership. Becoming a data centralised bank will require leaders and all stakeholders to prioritise removing inhibitors which have an implication on the data. Principles of data need to be adopted to ensure data is adequately stored, accessed, governed, and secured. An appropriate operating model to support data management will need to be in place. The architecture and technology need to be migrated from legacy systems to support the centralisation of data.

To tackle the findings from the three retail banks in relation to adopting technological innovation for data centralisation, retail banks should adopt the TOE framework (Tornatzky & Fleischer, 1990) by literature review:

Technological: Retail banks need to conduct a cost-benefit analysis that highlights the advantages of transitioning to data lakes for scalability and efficiency against maintaining outdated legacy systems. Implementing scalable APIs and robust data management practices in the effort of centralising data.

Organisational: group executives and CEOs need to update the operational model by incorporating key positions such as Chief Data Officer and data stewards, essential for strong data governance. Adopting a leadership approach that promotes vision sharing and communication, coupled with a culture supportive of continuous learning, is critical for driving innovation and value.

Environmental: The scarcity of data skills within the South African market, coupled with the high demand for these skills among competitors, presents a significant challenge for organisations aiming to leverage data technologies effectively.

CONCLUSION OF PROPOSITION 1

For retail banks to reach a successful digital transformation, a data strategy needs to also be implemented alongside a digital strategy. Furthermore, the success of implementation requires the support of leadership from executives to junior management to ensure there is buy-in and understanding of the objective towards a data-driven organisation.

During this study, a distinct lacuna was identified within the case organisations concerning the transmission of strategic objectives from executive leadership to the operational and junior management. Moreover, the organisational ethos has not fully embraced a data-driven approach, which is instrumental in fostering a unified customer perspective and ingraining it into the corporate culture.

The research indicates that for organisational change to be met with minimal resistance, it must be championed at the group level. It is incumbent upon the Chief Executive Officer (CEO), in concert with the Chief Information Officer (CIO) and the Chief Data Officer (CDO), to spearhead this initiative and disseminate a coherent message that facilitates the organisation's adoption of new practices. This study observed that the case organisations encountered considerable challenges in achieving adoption beyond their business units.

It is recommended that continuous learning initiatives be pursued to mitigate resistance and promote the assimilation of new strategies. This should encompass targeted training within business units and among leadership that necessitates further education to align with the strategic vision. Such interventions are anticipated to catalyse the cultural shift and enable a more seamless embrace of a data-centric, customer-focused approach across the organisation.

CONCLUSION OF PROPOSITION 2

There is a lack of customer centricity and the one-customer view across the retail banks and divisions of at least two of the banks investigated. This data lacks the full insights and predictive opportunities we can create value from knowing a customer across all segments. Data quality must be of the utmost importance in banks to prevent incorrect decisions based on data. Data redundancy and inconsistent data are risks to banks. Retail banks should adopt strict policies on quality and governance. Data access requires ownership to ensure that the correct people have access to data. In retail banks, access to decentralised data may be easier in some ways. Merging data from less secure environments into a centralised system can introduce risks and potentially violate compliance with data protection issues.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

This chapter will present the concluding statement based on the research questions introduced in Chapter 1. Based on the research, recommendations have been provided and suggestions for future research provided. The purpose of the study was to explore the application of digital transformation and data strategy approaches and further investigate the inhibitors of data centralisation.

6.2 CONCLUSION REGARDING RESEARCH QUESTIONS

6.2.1 How does digital strategy and culture affect the implementation of becoming a data-driven retail bank during a digital transformation?

A digital transformation supports the bank's strategic business goals. Leadership must be actively involved in deriving a data strategy that is an enabler of data implementation. The formation of a data strategy must be top-down to ensure a shared vision among senior and middle management. The approach must also be bottom-up to ensure that the data strategy is driven and addressed by data. It is critical to employ adequate capabilities and skill sets to support the transformation.

The culture of the retail bank during a transformation needs to be improved to ensure it encourages the theoretical framework employed namely the Digital culture principles: Impact, speed, openness, and autonomy. Retail banks need to become a learning organisation which ensures that continuous training takes place. From the findings, all retail banks were doing this well. As part of the learning knowledge and skills that help the bank adopt a data-driven thinking

organisation to be customer-centric, it must be availed to all stakeholders. Becoming customer-centric includes centralising data so that the retail bank has a single source of truth of the customer. Ideally, this should be extended to the group level as part of the roadmap.

6.2.2 Which aspects are inhibitors of implementing data centralisation and how does technology and architecture impact implementation of data centralisation?

Resolving the issues impacting data centralisation is essential for implementing the data-driven initiative. In this research, the inhibitors identified were the operating model, data management, and architecture. The operating model needs to change from a siloed approach, and Data roles, from executive roles to analysts, need to be hired in retail banks. A Chief Data officer and their supporting team need to be placed in the organisation structure of retail banking, especially for Bank X and Bank Y. Data stewards and custodians should be introduced to report to the Chief Data officer to support data strategy and governance.

Findings indicated that one of the largest inhibitors is data management. A new approach should be introduced to govern data to avoid challenges in data access, quality, security, and compliance. Audits should be carried out in retail banks to ensure that colleagues adhere to policies such as POPIA. The new technology that will help retail banks drive value needs to be adopted as a priority, and legacy systems need to be made absolute. The legacy systems are inhibitors that have posed negative implications such as high cost to maintain, trouble scaling and inability to integrate. It is pivotal that integration to new data technologies, such as data lakes and big data software, enable data centralisation and data-driven thinking to be implemented.

6.3 RECOMMENDATIONS

The research findings are proof that the South African retail banking market is moving at a fast pace towards data-driven organisations through digital transformations. It is the best time for retail banks to tackle inhibitors of centralisation to ensure that their data is accessible, high quality and secure. Adoption of good data principles and regulations such as the POPI Act is a step in the right direction to shifting the South African banking industry towards managing data much more efficiently whilst protecting the customer.

Recommendations are provided based on the findings of the research. These recommendations will be beneficial to executives, senior management, middle management and change management leaders of retail banks implementing a data strategy and undergoing a digital transformation. The recommendations provided are valuable for retail banks aspiring to transition into data-driven organisations that prioritise centralising data to adopt a customer-centric approach. While the leadership is embarking on the digital transformation to exercise to adopt to become data-driven, it is recommended to adopt and follow the Digital Culture framework (Westerman et al., 2019) with four key values: impact, speed, openness, and autonomy.

Impact: The retail bank must consistently leverage data and insights internally to foster innovation. The South African banking sector holds promising potential for global competitiveness in digital banking solutions. Centralising data stands out as an essential initial measure in this direction.

Speed: Leadership must foster an environment of using centralised data to make quick, informed decisions. Data centralisation significantly impacts the speed of accessing and processing data within retail banks.

Openness: The retail bank's leadership must model transparency and openness. By encouraging a culture of openness around a centralised data source, the retail

bank can unlock the full potential of its data assets, driving innovation, collaboration, and organizational growth.

Autonomy: The leadership must encourage an environment in the retail bank where all business units and segments are able to collaborate and access the same data and insights. Data teams must contribute and provide ideas to the data strategy as they can deduce key insights about the customers.

Recommendations are provided based on the findings of the research:

1. Data-driven data strategy

To tackle the primary issue of most banks prioritising business and digital strategies over data strategy, which often constitutes a smaller aspect of their strategy, retail banks need to strongly prioritise and invest in data strategy. Data strategy should be seen as the biggest enabler of a digital and, ultimately, a business strategy. The data strategy should be defined and addressed by insights and data from the bank to help drive business strategy KPIs. This effort should be bottom-up to ensure that the data is from the operational leadership. This could help address the gaps in decision-making happening in isolation and not including retail bank business units and functions. The strategy the leadership contribute towards should be addressed by data tools, insights, and the market.

2. Customer-centric thinking culture

The case organisations indicated a great desire and vision to transition towards becoming customer-centric. To ensure that a customer-centric culture is developed, the organisation should ensure the culture revolves around a customer-fits mindset rather than a bureaucratic one. If an initiative will assist a customer, then business units must work together to solve the problem. Leadership should role model this behaviour. Continuous learning must be offered in different forms that can showcase to staff members that leadership cares about the customer, over and above this address the mindset that respondents raised about lacking a ‘one-customer view’. An introduction of town

halls and integrating learning as part of performance reviews will ensure staff is encouraged.

3. Expand data capabilities

Findings indicated that there was a lack of modern data roles, and if there were data roles, there was no understanding of how to work with them. There should be a dedicated data team. The chief data officer and other data roles should be hired into the division. This team should be the key centralised data team in the division to ensure that optimum support is provided to the division and that governance is standardised.

4. Centralised data management

The findings have revealed that the decentralization of data has led to a host of issues, including data quality, access, security, and compliance. To mitigate these risks, we propose the introduction of automation of test data and the employment of data stewards and custodians. This will ensure that data access and governance align with our policies, and ultimately, enable a single customer view, supporting our data-driven thinking.

5. Modernise architecture

Findings and literature indicated that legacy systems were cumbersome to integrate and costly to maintain. Architecture should be upgraded to support technologies that enable a data lake and data warehouse in the banks Cloud based data storage must be used to ensure there are no longer on-premises risks. The use of APIs for data should be implemented. The retail bank should identify all decentralised data sources and develop a modernised architecture to centralise them. These data sources may be from business units or functions such as vehicle finance, insurance, home loans, and call centres. The data from the data sources and legacy systems should be migrated into the centralised

repositories such as data lake and data warehouse. The data should be designed and stored in an effective manner in the centralised repository. The implication of the modernised architecture for the retail bank is cost savings on storage, real-time data processing, a 360 view of the customer as a bank, integrated analytics, and smarter models.

6.4 LIMITATIONS

The sample size of the research was limited to the retail division of the three banks and did not include other divisions such as Wealth, Corporate investment banking, and Commercial investment banking. The three banks had slightly different naming conventions, which led to interchanging corporate and commercial segments and divisions. Participants were limited to those working in the division and the technology function, thus limiting views. Nuances may be found in different divisions, which will affect the generalisation of the findings. The study is within the context of the three largest banks, so nuances may exist in different bank contexts. Due to time and consideration that it is a Master's degree, the researcher took advise to limit the case to only three banks. The study only included South African banks. The study did not consider investigating data maturity and its impact on data security. It is the impression of the researcher that digital maturity, data maturity, architecture complexity and technology upgrades need to be considered when analysing banks that are undergoing a digital transformation.

6.5. SUGGESTIONS FOR FUTURE RESEARCH

The following have been identified for further research:

1. The digital culture framework can be used to assess organisations undergoing digital transformation. There was no readily available framework to support data centralisation as this is a new phenomenon; the development of this would be used to guide organisations through this process.
2. This research studies data centralisation as an enabler for digital transformation in South African retail banks. It would be interesting to conduct the study in the context of Corporate, Wealth or the African continent.
3. This research studies data centralisation as an enabler of digital transformation. It would be interesting to take it one step further and conduct a Data maturity study of the three top banks to see how far they have gotten in their journey.

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The significance of this study contributes to the body of knowledge of data centralisation in retail banking for South African banks.

i. The study highlights inhibitors of data centralisation in retail banking

ii. This study highlights areas of a data strategy to support a digital transformation

iii. This study highlights enablers of data centralisation and the implementation factors to ensure a data-driven customer retail bank

References

Abraham, R., Schneider, J., & vom Brocke, J. . (2019). A conceptual framework for data governance: Building blocks and research agenda. *International Journal of Information Management, 49*, 426-436. https://doi.org/doi:10.1016/j.ijinfomgt.2019.07.008

Abumandil, M. S., & Hassan, S. B. (2016). Impact of Centralization on the Relationship of Information Quality and Decision Making Effectiveness: Empirical Evidence from the Palestinian Banking Sector. *International Journal of Scientific and Research Publications, 6*(9).

Accenture. (2019a). *Unlocking digital value in South Africa's retail banking and insurance sector*. https://www.accenture.com/_acnmedia/PDF-116/Accenture-DTI-FS-industry-POV.pdf

Accessible Law. (2019, September 17). *Big data*. POPIA. https://popia.co.za/category/big-data/

Adams, W. C. (2015). Conducting semi-structured interviews. In *Handbook of practical program evaluation* (pp. 492-505).

Adams, W. C. (2015). Conducting semi-structured interviews. In *Handbook of practical program evaluation* (pp. 492-505).

Al Kilani, M., & Kobziev, V. (2016). An Overview of Research Methodology in Information System (IS). *Open Access Library Journal, 3*(e3126). https://doi.org/http://dx.doi.org/10.4236/oalib.1103126

Alotaibi, R. (2019). Access control models in NoSQL databases: An overview. *Journal of King Abdulaziz University - Computing and Information Technology Sciences,, 1*(8), 1-9. https://doi.org/10.4197/comp.8-1.1

Alston, A. (2017). Attribute-based encryption for attribute-based authentication, authorization, storage, and transmission in distributed storage systems. https://doi.org/10.48550/arxiv.1705.06002

Andrade, C. (2021). The Inconvenient Truth About Convenience and Purposive Samples. *Indian Journal of Psychological Medicine, 43*(1), 86-88.

Andrade, C. (2021). The Inconvenient Truth About Convenience and Purposive Samples. *Indian Journal of Psychological Medicine, 43*(1), 86-88.

Armstrong, B. (2019). *Digital Transformation and Change Management.*

Baker, J. (2012). The Technology–Organization–Environment Framework. In Y. Dwivedi, M. Wade, & S. Schneberger, *Information Systems Theory* (Vol. 28, pp. 231–245). New York, NY: Springer. https://doi.org/https://doi.org/10.1007/978-1-4419-6108-2_12

Becker, J., Knackstedt, R., & Pöppelbuß, J. (2009). Developing Maturity Models for IT Management. *Business & Information Systems Engineering,, 1*(3), 213-222. https://doi.org/https://doi.org/10.1007/s12599-009-0044-5

Bertino, E., & R. Sandhu. (2005). Database security - concepts, approaches, and challenges. *IEEE Transactions on Dependable and Secure Computing, 2*(1), 2-19. https://doi.org/10.1109/TDSC.2005.9.

Bharadwaj, A., el Sawy, O. A., Pavlou, P. A., & & Venkatraman, N. (2013). Digital Business Strategy: Toward a Next Generation of Insights. *MIS Quarterly, 37*(2), 471-482. https://doi.org/https://doi.org/10.25300/misq/2013/37:2.3

Boukis, A. K. (2015). Linking internal marketing with customer outcomes. *Marketing Intelligence & Planning, 33*(3), 394-413. https://doi.org/10.1108/mip-02-2014-0024

Braun, V., & Clarke, V. (2006). Using Thematic Analysis in Psychology. *Qual ResPsychol, 3*(2), 77-101.

Cambridge Service Alliance. (2017, November). *Digital Business Transformation and Strategy: What Do We Know So Far?* cambridgeservicealliance. https://cambridgeservicealliance.eng.cam.ac.uk/system/files/documents/2017NovPaper_Mariam.pdf

Cao, R., & Iansiti, M. (2022). Digital transformation, data architecture, and legacy systems. *Journal of Digital Economy, 1*(1), 1-19. https://doi.org/https://doi.org/10.1016/j.jdec.2022.07.001

Capgemini. (2017). *DIGITAL TRANSFORMATION: A ROADMAP FOR BILLION-DOLLAR ORGANIZATIONS*. https://www.capgemini.com/wpcontent/uploads/2017/07/Digital_Transformation__A_Road-Map_for_BillionDollar_Organisations.pdf.

Carruthers, C. &. (2017). Delivering a data strategy in the cauldron of BAU. In *The Chief Data Officer's Playbook* (pp. 41-48).

Cassell, C., & Symon, G. (2004). Essential Guide to Qualitative Methods in Organisational. In N. King, *Using templates in the thematic analysis of text* (pp. 257-270). SAGE Publications.

Clarke, A. M., & Jack, B. (1998). The benefits of using qualitative research. *The Benefits of Using Qualitative Research, 13*(12), 847.

Cloudcarib. (2021, July 29). *The Benefits of Cloud Computing for Government.* Cloudcarib. https://info.cloudcarib.com/blog/the-benefits-of-cloud-computing-for-government

Cohen, L., Manion, L., & Morrison, K. (2011). *Research Methods in Education* . England: Routledge.

Correani, A., de Massis, A., Frattini, F., Petruzzelli, A. M., & Natalicchio, A. (2020). Implementing a Digital Strategy: Learning from the Experience of Three Digital Transformation Projects. *California Management Review, 62*(4), 37-56. https://doi.org/https://doi.org/10.1177/0008125620934864

Dallemule, L., & Thomas, H. (2017, May 1). *WHAT'S YOUR DATA STRATEGY?* Harvard Business Review. https://hbr.org/2017/05/whats-your-data-strategy

Davies, L. (2022, April 22). *What is the Hierarchy of Needs in Data Science?* Noodle. https://resources.noodle.com/articles/data-science-hierarchy-of-needs/

DeBruin, T., Rosemann, M., Freeze, R., & Kaulkarni, U. (2005). Understanding the Main Phases of Developing a Maturity Assessment Model. In D. Bunker, B. Campbell, & J. Underwood, *Australasian Conference on Information Systems (ACIS).* (pp. 8-19).

Deloitte. (2020, October 5). *The future of retail banking. Deloitte United States.* . https://www2.deloitte.com/us/en/pages/financial-services/articles/future-of-retail-banking.html

Discovery Bank. (2021, March). *The application of shared value in banking*. Discovery. https://www.discovery.co.za/wcm/discoverycoza/assets/bank/the-application-of-shared-value-in-banking.pdf

Earley, S., Henderson, D., & Sebastian-Coleman, L. (2017). *The DAMA Guide to the Data Management Body of Knowledge (DAMA-DMBOK).* Bradley Beach, NJ: Technics Publications, LLC.

Edegbe, G. N., & Onianwa, C. U. (2022). The imperative of technical skilled staff in legacy information system management. *International Journal of Innovative Computing, 12*(2), 37-44. https://doi.org/10.11113/ijic.v12n2.377

Favaretto, M., de Clercq, E., Schneble, C. O., & Elger, B. S. (2020). What is your definition of Big Data? Researchers' understanding of the phenomenon of the decade. *PLOS ONE, 15*(2). https://doi.org/https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0228987

Fernandez, K. V., & Beverland, M. (2019). As the record spins: materialising connections. *European Journal of Marketing, 53*(6), 1152-1175. https://doi.org/10.1108/ejm-12-2016-0828

Fuchs, C., & Horak, E. (2008). Africa and the digital divide. *Telematics and Informatics, 25*(2), 99-116. https://doi.org/https://doi.org/10.1016/j.tele.2006.06.004

Gartner . (2021). *Definition of Digital Transformation - Gartner Information Technology Glossary*. Gartner . https://www.gartner.com/en/information-technology/glossary/digital-transformation

Göhlich.M., Schröer.A., Weber.S.M., & Engel.N. (2018). *Organisationales Lernen als zentraler Gegenstand der Organisationspädagogik.* Springer VS. https://doi.org/https://doi.org/10.1007/978-3-658-07512-5_3

Gradillas, M., & Thomas, L. D. (2023). Distinguishing digitization and digitalization: A systematic review and conceptual framework. *Journal of Product Innovation Management.*

Guha, P. (2018). Application of multivariate-rank-based techniques in clustering of big data. *Vikalpa the Journal for Decision Makers, 4*(43), 179-190. https://doi.org/10.1177/0256090918804385

Guha, P. (2018). Application of multivariate-rank-based techniques in clustering of big data. *Vikalpa: The Journal for Decision Makers, 43*(4), 179-190. https://doi.org/10.1177/0256090918804385

Hartman Advisors. (2021, March 15). *4 Ways Digital Transformation Will Impact Banking.* Hartman . https://hartmanadvisors.com/4-ways-digital-transformation-will-impact-banking/

Hassan, M., & M, T. (2018). CUSTOMER PROFILING AND SEGMENTATION IN RETAIL BANKS USING DATA MINING TECHNIQUES. *International Journal of Advanced Research in Computer Science, 4*, 24-29. https://doi.org/10.26483/ijarcs.v9i4.6172.

Heiligenthal, P. (2003). Integrating legacy systems with data reverse engineering and patterns. *INCOSE International Symposium, 13*(1), 1462-1474. https://doi.org/10.1002/j.2334-5837.2003.tb02719.x

Henfridsson, O. &. (2013). The Generative Mechanisms of Digital Infrastructure Evolution. *MIS Quarterly, 37*(3), 907-931. https://doi.org/https://doi.org/10.25300/misq/2013/37.3.11

Hernán, M., & Robins, J. (2016). Using big data to emulate a target trial when a randomized trial is not available: table 1. *American Journal of Epidemiology, 183*(8), 758-764. https://doi.org/10.1093/aje/kwv254

Hie, B. P. (2019). IMPACT OF TRANSFORMING ORGANISATIONAL CULTUAND DIGITAL TRANSFORMATION GOVERNANCE TOWARD DIGITAL MATURITY IN INDONESIAN BANK. *International Review of Management and Marketing, 9*(6), 51-57. https://doi.org/https://doi.org/10.32479/irmm.8785

Holland, C. P., Light, B., & Kawalek, P. (1999). Focus issue on legacy information systems and business process change: introduction. *Communications of the Association for Information Systems, 2*. https://doi.org/10.17705/1cais.00209

Horlach, B., Drews, P., & Schirmer, I. (2016). Bimodal IT: Business-IT alignment in the age of digital transformation. *Bimodal IT: Business-IT Alignment in the Age of Digital Transformation*, 1417–1428.

HSBC. (2019, November). *Banking of the future: Finance in the digital age.* https://www.hsbc.com/-/files/hsbc/news-and-insight/2019/pdf/191108-bof-report.pdf

Ismail, M. H., Khater, M., & Zaki, M. (2017). *Digital Business Transformation and Strategy: What Do We Know So Far*. Cambridge Service Alliance. https://cambridgeservicealliance.eng.cam.ac.uk/resources/Downloads/Monthly%20Papers/2017NovPaper_Mariam.pdf.

IT Governance. (2013, January 1). *IT Governance*. Https://Www.Itgovernance.Co.Za/Popi_and_cloud_computing.Pdf

Iyamu, I., Xu, A., Gómez-Ramírez, O., Ablona, A., Chang, H., McKee, G., & Gilbert, M. (2021). Defining digital public health and the role of digitisation, digitalisation, and digital transformation: scoping review. *Jmir Public Health and Surveillance, 7*(11). https://doi.org/10.2196/30399

Iyer, B., & Henderson, J. (2010). Preparing for the Future: Understanding the Seven Capabilities of Cloud Computing,. *MIS Quarterly Executive, 9*(2), 117-131. https://binaryblurring.com/2011/05/20/the-7-capabilities-of-cloud-computing-a-review-of-a-recent-misqe-article-on-cloud/%E2%80%8B

Kallinikos, J., Aaltonen, A., & & Marton, A. (2013). The Ambivalent Ontology of Digital Artifacts. *MIS Quarterly, 37*(2), 357–370. https://doi.org/https://doi.org/10.25300/misq/2013/37.2.02

Kane, C., Palmer, D., Phillips, A., Kiron, D., & & Buckley, N. (2015). *Strategy, Not Technology, Drives Digital Transformation, 1–25*. https://www.cubility.com.au/wp-content/uploads/2018/11/dup_strategy-not-technology-drives-digital-transformation.pdf

Kitsios, F., Giatsidis, I., & Kamariotou, M. (2021). Digital transformation and strategy in the banking sector: evaluating the acceptance rate of e-services. *Journal of Open*

Innovation Technology Market and Complexity, 7(3), 204. https://doi.org/10.3390/joitmc7030204

Kotter, J. P. (2016). *Leading Change: Why Transformation Efforts Fail*. Harvard Business Review. https://hbr.org/1995/05/leading-change-why-transformation-efforts-fail-2

Lestari., Rahmawatie., & Wulandari. (2023). Does Online Interprofessional Case-Based Learning Facilitate Collaborative Knowledge Construction? *J Multidiscip Healthc., 16*, 85-99. https://doi.org/10.2147/JMDH.S391997

Levy, E. (2018, October 1). *"5 essential components of a data strategy"*. SAS Whitepaper. https://www.sas.com/content/dam/SAS/en_au/doc/whitepaper1/five-essential-components-data-strategy.pdf

Li, C., Zegras, P. C., Zhao, F., Qin, Z., Shahid, A., Ben-Akiva, M., & Zhao, J. (2017). Enabling bus transit service quality co-monitoring through smartphone-based platform. *Transportation Research Record: Journal of the Transportation Research Board, 2649*(1), 42-51. https://doi.org/10.3141/2649-05

Liaw., Pearce., Liyanage., GSS., L., & S, d. L. (2014). An integrated organisation-wide data quality management and information governance framework: theoretical underpinnings. *Inform Prim Care, 21*(4), 199-206.

Lin, Y., Yang, L., Lin, L., & Chen, Y. (2014). Preserving privacy in outsourced database. *International Journal of Computer and Communication Engineering, 3*(5), 361-366. https://doi.org/10.7763/ijcce.2014.v3.350

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry.* India: SAGE Publications.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry.* SAGE Publications.

Makamase, M. (2018a). *The Fourth Industrial Revolution: Impact on unemployment and inequality in South Africa.* Igd. https://www.igd.org.za/infocus/12080-the-fourth-industrial-revolution-impact-on-unemployemnet-and-inequality-in-south-africa

Makamase, M. (2018b). *The Fourth Industrial Revolution: Impact on unemployment and inequality in South Africa.* Igd. https://www.igd.org.za/infocus/12080-the-fourth-industrial-revolution-impact-on-unemployemnet-and-inequality-in-south-africa

Makamase, M. (2019, November 15). *The Fourth Industrial Revolution: Impact on unemployment and inequality in South Africa.* Institute for Global Dialogue. https://www.igd.org.za/infocus/12080-the-fourth-industrial-revolution-impact-on-unemployemnet-and-inequality-in-south-africa

Manatt, Phelps & Phillips LLP. (2021, July 14). *Fintech Laws and Regulations USA*. ICLG.com. https://iclg.com/practice-areas/fintech-laws-and-regulations/usa

McKinsey & Company. (2018, July 3). *Getting your data house in order.* McKinsey & Company.. https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/digital-and-analytics-in-consumer/capabilities/getting-your-data-house-in-order

Mckinsey. (2020, January 24). *Unlocking success in digital transformations. McKinsey & Company*. . https://www.mckinsey.com/business-functions/organisation/our-insights/unlocking-success-in-digital-transformations

Miragliotta, G., Sianesi, A., Convertini, E., & Distante, R. (2018). Data driven management in Industry 4.0: a method to measure Data Productivity. *IFAC PapersOnLine, 51*(11), 19-24.

Moloi, D., Zibani, S., & Teane, L. (2018). Fourth industrial revolution and the future of government. *Service Delivery Review, 11*(3), 2-34.

Moody, D. L., & Walsh, P. (1999). Measuring the Value of Information-an Asset Valuation Approach. In *European Conference on Information Systems (ECIS'99)* (pp. 496-512).

Nachit, H., & Belhcen, L. (2020). Digital Transformation in Times of COVID-19 Pandemic: The Case of Morocco. *SSRN Electronic Journal*. https://doi.org/https://doi.org/10.2139/ssrn.3645084

NYU Dispatch. (2018, October 4). *Cloud computing public policy and economic issues*. NYU . https://wp.nyu.edu/dispatch/2018/10/04/cloud-computing-public-policy-and-economic-issues/%E2%80%8B

Olayinka, O., & Wynn, M. (2022). Digital transformation in the nigerian small business sector. 359-382. https://doi.org/10.4018/978-1-7998-7712-7.ch019

Otto, B. (2011b). Organizing data governance: findings from the telecommunications industry and consequences for large service providers. *Communications of the AIS, 29*, 45-66.

Perrons, R. K., & Jensen, J. W. (2015). Data as an asset: What the oil and gas sector can learn from other industries about "Big Data." Energy Policy. *81*, 117-121. https://doi.org/https://doi.org/10.1016/j.enpol.2015.02.020

Petrović, M. (2020). Data quality in customer relationship management (crm): literature review. *Strategic Management, 25*(2), 40-47. https://doi.org/10.5937/strama

Pettey, C. (2019, March 08). *Why Data and Analytics Are Key to Digital Transformation*. gartner. https://www.gartner.com/smarterwithgartner/why-data-and-analytics-are-key-to-digital-transformation

PWC. (2021). *The future of banking: A South African perspective.* https://www.pwc.co.za/en/assets/pdf/strategyand-future-of-banking.pdf

Rehman, M. H., Chang, V., Batool, A., & Wah, T. Y. (2016). Big data reduction framework for value creation in sustainable enterprises. *International Journal of Information Management, 36*(6), 917-928.

Rice, M. F. (2003). Information and communication technologies and the global digital divide: Technology transfer, development, and least developing countries. *Comparative Technology Transfer and Society, 1*(1), 72-88.

Rickards, T., Smaje, K., & & Sohoni, V. (2018, February 16). *'Transformer in chief': The new chief digital officer. McKinsey & Company.* . https://www.mckinsey.com/business-functions/organisation/our-insights/transformer-in-chief-the-new-chief-digital-officer

Rogati, M. (2017, June 12). *The AI Hierarchy of Needs*. hackernoon. https://hackernoon.com/the-ai-hierarchy-of-needs-18f111fcc007

Rus, S. (2017). The behavior of customers regarding e-banking and its impact on banking sector. *The European Proceedings of Social and Behavioural Sciences*. https://doi.org/doi.org/10.15405/epsbs.2017.01.02.24

Schilling, R., Aier, S., Winter, R., & Haki, K. (2020). *Design dimensions for enterprise-wide data management: A Chief Data Officer's journey. Proceedings of the 53rd Hawaii International Conference on System Sciences.* https://hdl.handle.net/10125/64456

Shah, S., Peristeras, V., & Magnisalis, I. (2021). Dalif: a data lifecycle framework for data-driven governments. *Journal of Big Data, 8*(1). https://doi.org/10.1186/s40537-021-00481-3

Spruit, M., & Pietzka, K. (2015). MD3M: The master data management maturity model. *Computers in Human Behavior, 51*, 1068-1076. https://doi.org/https://doi.org/10.1016/j.chb.2014.09.030

Stanton, K. R. (2002). Trends in relationship lending and factors affecting relationship lending efficiency. *Journal of Banking & Finance, 26*(1), 127-152. https://doi.org/https://doi.org/10.1016/s0378-4266(00)00171-0

Statistics South Africa. (2020, March). *Gross Domestic Product*. Stats SA. http://www.statssa.gov.za/publications/P0441/GDP%202019%20Q4%20(Media%20presentation).pdf

Stratulat, O. (2021). Retail banking concept from a formal perspective. *Economica, 3*(117), 114-119. https://doi.org/10.53486/econ.2021.117.114

Tamr. (2023). *5 Pillars of a Modern Data Strategy*. Tamr. https://www.tamr.com/blog/5-pillars-of-a-modern-data-strategy

Thomas, D. R. (2003, August). *A general inductive approach for qualitative data analysis.* https://www.researchgate.net/profile/David-Thomas-

57/publication/263769109_Thomas_2003_General_Inductive_Analysis_-_Original_web_version/links/0a85e53bdc04f64786000000/Thomas-2003-General-Inductive-Analysis-Original-web-version.pdf

Tornatzky, L. G., & Fleischer, M. (1990). *The processes of technological innovation.* Lexington: Lexington Books.

Troilo, G., Luca, L., & Guenzi, P. (2017). Linking data-rich environments with service innovation in incumbent firms: a conceptual framework and research propositions. *Journal of Product Innovation Management, 34*(5), 617-639. https://doi.org/10.1111/jpim.12395

UBS. (2017, August 8). *The Digital Vortex in 2017: It's not a question of "when."*. IMD Business School. https://www.imd.org/research-knowledge/articles/digital-vortex-in-2017/

Wade, M. R., Shan, J., & Noronha, A. (2017). *Life in the Digital Vortex: The State of Digital Disruption in 2017.*

Weinberg, N. (2009, January). *Cloud computing: Hot technology for 2009*. Network World.. https://www.networkworld.com/article/2271254/cloud-computing--hot-technology-for-2009.html

Westerman, G., Soule, D., & Eswaran, A. (2019, May 21). *Building Digital-Ready Culture in Traditional Organisations.* MIT Sloan Management Review.. https://sloanreview.mit.edu/article/building-digital-ready-culture-in-traditional-organisations/

Wu, G. (2015). *Design and implementation of financial warning system based on large data.* https://doi.org/10.2991/icmmita-15.2015.20

Yaghubi, N., & Seyedin, S. (2003). Ranking the technical dimensions of e-banking service quality evaluation models using Analytical Hierarchy Process. . *Advances in Computer Science, 4*(1), 37-43.

Zeranski, S., & Sancak, I. E. (2020). Digitalisation of Financial Supervision with Supervisory Technology (SupTech). *SSRN Electronic Journal*. https://doi.org/https://doi.org/10.2139/ssrn.3632053

Zhang, X., & Chen, X. (2019). Data security sharing and storage based on a consortium blockchain in a vehicular ad-hoc network. *IEEE Access, 7*, 58241-58254. https://doi.org/10.1109/ACCESS.2018.2890736

Zhao, Y., & Kamioka, T. (2022). *Understanding the role of Chief data Officers: insights from Japanese companies. In Proceedings of the 26th Pacific Asia Conference on Information Systems.*

APPENDIX A: Participant Information Sheet

Dear Sir/Madam,

I appreciate your help with participating in the interview for my Master's research. The purpose of the research is to assess the digital transformation of the bank and the challenges of data centralisation which affect the implementation of a data strategy.

The interview will include questions related to the digital transformation, data maturity and data centralisation of the bank. Your anonymity will be respected upon publication of the research, so your honesty will be appreciated.

You will not be advantaged or disadvantaged in any way. You can withdraw your permission at any time during this project without any penalty. There are no foreseeable risks in participating in this study. The participants will not be paid for this study. All confidential research data will be destroyed after publication as some findings may be used by other researchers. Recording during interviews will take place. Consent to your participation is deemed voluntary upon signing and requesting permission.

I _____,
consent in writing to conduct my research face-to-face or virtually with the researcher Keitumetse Monyamane.

The permission letter should be on your organisation's headed paper, signed and dated, and specifically referring to myself by name and the title of my study. Please let me know if you require any further information.

Signed: _____
Date: _____
Keitumetse Monyamane
541813@students.wits.ac.za
Supervisor:
Ayanda Magida
ayanda.magida@wits.ac.za

APPENDIX B: Instrument - Interview Questionnaire

Common

Read research participant form and let them consent and agree.

1. Please state your role and tenure at Bank X
2. Please state your Gender, age, qualification

Digital Strategy

Strategy

1. How does the bank's digital transformation align with and contribute to the broader business objectives?
2. How do digital champions spearhead digital transformation and what strategies are employed to overcome employee resistance?
3. Who are the digital champions of the digital transformation and how does the vision cascade to the operation teams i.e. CDO?
4. Describe the autonomy and ownership to drive the digital transformation?
5. How would you describe employee mindset and resistance towards digitisation in the organisation?
6. Are all stakeholders of the bank aware of the digital transformation and the outcomes expected?

Retail banking culture and op model

1. How has the bank adopted people development strategies regarding managing and adopting change?
2. How are staff members adopting new digital technologies which help with productivity and efficiency?

Data strategy

Implementation

1. How has the implementation of data-driven strategies contributed to the digital transformation efforts within the bank?

2. What data strategies are implemented within divisions and how is data shared across the bank?

3. Could you explain how your bank has organized its data management approach in alignment with digital transformation initiatives? centralised/decentralise governance, data lake, data team setup (go through data team)

4. What positive and negative impact have you seen on decentralised data management on the bank success of digital transformation efforts in the bank?

5. How can a bank's data architecture decisions, especially in a decentralized context, contribute to data security and overall success in the digital transformation initiative?

6. In the context of data management, describe how the bank approaches the concept of a single source of truth versus multiple sources of truth?

7. In the context of the bank's data strategy, how does the decentralisation of data impact the efficiency of data access and data quality?

8. What are the technologies chosen to support the data strategy in the context of digital transformation?

Challenges/factors

1. How does the bank's legacy systems pose challenges or opportunities for the data strategy within the context of digital transformation?

2. Describe the challenges of decentralised data in line with customer centricity in the bank?

3. What data-driven decision opportunities are missed by traditional data management in the bank's way of working?

4. Are the skills available within the bank sufficient to effectively execute the data strategy, and if not, what specific skill deficiencies can be identified for its successful implementation?

APPENDIX C: Ethics clearance

Graduate School of Business Administration
University of the Witwatersrand, Johannesburg

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

Ethics Clearance Certificate

Ethics protocol number: WBS/DB541813/456
This certificate is only valid with a legitimate ethics protocol number and signed by the Researcher (below,

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

Project title	Data centralisation as a key enabler of digital transformation in a South African bank
Investigator / Researcher	Miss Keitumetse Lucy Monyamane
Nature of Project	MM (Digital Business)
Decision of the Committee	Approved, provided stakeholders and participants are guaranteed confidentialty.
Issue Date of Certificate	2021-11-11
Expiry date	Date of submission of the project report
Chairperson	Prof Anthony Stacey ☎ +27 11 717 3587 +27 82 880 4531 anthony.stacey@wits.ac.za

Declaration by Researcher

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

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

Signature

12 November 2021 Date: