COMMERCIAL SEGMENT COMPETITIVENESS IN A MARKET DISRUPTED BY DIGITAL BANKS IN SOUTH AFRICA

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DECLARATION

I Lebohang Tshabalala, hereby declare that the work in this research report represents my own efforts and findings except where indicated. All related references, to the best of my knowledge, are accurately presented.

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ABSTRACT

The South African banking market was largely dominated by the big four banks: Absa, Nedbank, Standard bank and FNB prior to the introduction of digital banks in South Africa. The introduction of these new entrants has meant that the domination is slowly starting to cease as many of the small and medium enterprises are migrating to these new entrants because of the affordable pricing options and contextual solution they offer, which is enabled by the adoption of industry 4.0 technologies as their core operating model. This research aims to unpack what the commercial segment of Bank A can do to bride the digital divide opened by digital banks.

A qualitative study was used to explore the subjective views and opinions of eight subject matter experts in the commercial segment of Bank A. The subject matter experts were chosen based on their experience and vested interest in the study. Semi structured interviews were used as a data collection means and questions were drawn from the initial conceptual framework and the literature drawn. Thematic content technique was used in this study.

In response to the objectives of the study, data reveals that Bank A should accelerate the adoption of industry 4.0 technologies to drive operational efficiencies and cost reduction. Optimise business processes by improving the data architecture to obtain meaningful data and apply the agile project delivery methodology to accelerate the delivery and marketing of solutions to customers. Two new themes emerged in the data analytics i.e., implementation of a hybrid core banking application (new core banking + legacy core banking) which entails using the best of both worlds. Collaborating with third party organisation i.e., fintech's and the regulators to drive and optimise solution delivery. Lastly the recommendation on how the bank can bridge the digital gap are given.

Table of Contents

Table of Figures

Chapter 1

1. Introduction

1.1. Research background/context

In the past three centuries, there have been 3 successive industrial revolutions which have significantly changed the world. According to Bahrin et al (2016), the current 4th Industrial Revolution, Industry 4.0, is a new digital structure which brings about globalization and interconnectedness using the globally available information and communication networks. This has created huge expansion of business across different borders in the world. This new structure can be categorized as the new digital revolution era which has the capability of taking a new dimension and shape at any given time (Bahrin et al 2016).

Many organizations have been forced to align to the technological advancements introduced by the 4th industrial revolution to remain profitable. Industry 4.0 has challenged many business models to either adapt quickly or let their businesses be insolvent at the hands of their competitors across all the sectors that make up the global economy, i.e. Manufacturing, Banking, Retail (Mekinjić,2019). While the technology that is brought about by Industry 4.0 has been disruptive to many business models across different sectors, it has, however, also brought about digital and technological advancements which has simplified the entire life of mankind. (Mekinjić, 2019). Industry 4.0 is inevitable and according to estimates from PwC (2018), digitization and smart automation will contribute approximately 14% which is likely to be $15 trillion in value, to the global GDP gains (Nukon 2018).

According to McKinsey (2017) Africa's banking market is currently $86 billion in revenue before risk costs and traditional banks who adopt digitalization can expect to grow their revenue by approximately 8.5% per year until 2022 which will likely bring the continents revenue to $129 billion. Prior to the emergence of digital banks, banking in South Africa was largely dominated by the big four banks, i.e., FNB, ABSA, Nedbank, and Standard Bank. The dominance is slowly starting to cease now as a result of disruptions which are brought about by new digital banks. The Citizen (2020) have reported that Absa lost 200 000 entry level customers with one of the major factors being pricing.

Temelkov (2020) argues that traditional banking business models were never challenged for decades, however, the 2008 financial crisis has allowed for the birth of new entrants providing competition to incumbent traditional banks. Temelkov (2020), further argues the new entrants were born because of the changes in the regulations which eased the requirements to enter the financial services industry coupled with the rapid raise in technology.

William (2018) argues that traditional banking is mostly associated with legacy operational systems, which are static to run particularly the core banking applications, this as a result makes banks to be less responsive to change and seizing new market opportunities. According to FirstRand (2018), running legacy core banking applications and other I.T related system on the mainframe technology resulted in approximately 11% of the operating costs excluding staff members working on the technology in 2018. These costs are ultimately pushed to the customers in a form of service or monthly account fees. This is where digital banks like Tyme Bank have seized on the opportunity to develop digital solutions like cloud enabled core banking applications to ensure that that overhead associated with the technology is kept to less than a 1% of the operating costs. According to estimates by Business Tech (2019) it has been observed that one of the digital banks in South Africa Tyme Bank has gained approximately one million customers in less than eight months of operation. Most of these customers can be accounted for from the traditional banking's customer base in both the retail and commercial segment.

This research investigated how a traditional bank in South Africa, Bank A, can fully embrace the principles of Industry 4.0 in order to keep up with the emerging digital banks which have disrupted the financial services market. This project was conducted at Bank A's Commercial Segment.

1.2. Problem statement/motivation

The question arises as to how the commercial segment of a traditional bank such as Bank A can remain profitable in the 21st century, considering the emergence of digital banks in South Africa. Digital banks have developed a low-cost banking fee model which gives them access to the unbanked population. They are, however, also getting access to the traditional banking customers who prefer the simplicity of banking in the comfort of their smart phones coupled with a low-cost banking fee. TymeBank is one of these digital banks and since entering the market, Nedbank and Capitec had to cut their monthly account fee by approximately 50c to ensure they retain their customers who were threating to leave and join banks who offer better monthly account fee rates (Mungadze, 2020).

There is, thus, a need to investigate how the commercial segment of a traditional Bank A can do to respond to the challenges that digital banks bring in this digital age to ensure that customers are retained and no further revenue is lost.

1.3. Research questions

The above then leads to this Critical Research Question:
How can the commercial segments of a traditional Bank A can bridge the digital divide brought by Digital banks, to ensure they retain their customers?

1.4. Research objectives

The main objective of this research is, thus, to investigate how Bank A's Commercial division can bridge the digital gap to empower the bank to be more responsive to change so that it can seize new market opportunities with the aim of satisfying their customers and prevent revenue losses in the hands of new digital banks.
This will be achieved by:

1. Developing a conceptual framework to evaluate which Industry 4.0 technologies and strategies can be embraced in the Commercial banking segment of a traditional bank to be competitive.

2. Investigating the impact of enabling digital solutions in traditional banking models.

3. Make recommendations on how a Commercial division of a traditional bank can bridge the digital gap opened by Digital Banks in South Africa.

1.5. Research Methodology

A qualitative approach was used in this study because it gives an in-depth understanding of the phenomenon being explored where little information exits. The adoption of industry 4.0 technologies is still relatively low in the commercial segment of Bank A; thus, this research was deemed exploratory. Collection of data was done by means of semi-structured interviews wherein subjective views, experiences, beliefs and or motivations of subject matter experts (SME's) who are experienced and have a vested interest in the technological advancement brought about by Industry 4.0. was explored. The target population for this research includes SME's from Bank A within the Commercial Segment. To ensure the credibility of the research validity and reliability of the research

was prove, validity was proven by exploring the following areas: construct, internal and external validity. Reliability was proven by conforming to the following principles: dependability, transferability, and confirmability. This research had ethical consideration and the following ethics clearance number was obtained:
Ethics number MIAEC 115/20

1.6. Chapter Outline

This report consists of six chapters which are outlined below:

1.6.1. Chapter One: Introduction

This chapter gives and introduction & background of the research and presents the summary of the research problem, objectives and the research methodology used.

1.6.2. Chapter Two: Literature Review

The literature review chapter gives an outline of how the technological advancement brought about by industry 4.0 has revolutionized the financial services industry, it will further explore the characteristics of traditional banking and its operating models and compare that with characteristics of a digital banks which have embraced the technological advancement introduced by industry 4.0

1.6.3. Chapter Three: Research Methodology

This chapter outlines the research method that has been used to collect data for this study. In more detail this chapter will be broken down into the following sub-segments; research design method, the data collection method followed, sampling method that was used, research process that was followed, data analysis procedure that was followed, the reliability and validity to ensure that the research is valid and reliable, the ethical considerations and the research limitation of the project will be explored.

1.6.4. Chapter Four: Results and Analysis

This chapter analyses the results of the qualitative data collected from semi-structured interviews. It includes sub-chapters in accordance with the research question

1.6.5. Chapter Five: Discussions

This chapter links the results obtained in chapter 4 to the literature review and interpretations are introduced in this chapter

1.6.6. Chapter Six: Conclusions and Recommendations

Final chapter will draw conclusions gained from the results, and recommendation are made for the future studies

Chapter 2

2. Literature review

2.1. Introduction

The purpose of this literature review is to first outline the technological advancement introduced by Industry 4.0; it will then discuss how these advancements have revolutionised the banking sector in the world. It will further explore the characteristics of traditional banking and compare it with characteristics of digital banks which have embraced technology as core to their operating models.

2.2. Industry 4.0

The technological world is evolving at a rapid pace, thanks to the introduction of 5G networks, big data, computational capability, cloud storage, and new tools to automate repetitive tasks. According to Mehdiabadi et al (2020), morden technology has paved a way for a wide range of applications and has played an important role in bridging the communication gab across different industries in the world. Mehdiabadi et al (2020) further argues that the introduction of new applications has opened doors of innovation which has paved a way for revenue growth for different companies across different sectors.

The adoption of digital transformation for any organization is an incredible task that requires the willingness to change the culture, the ability to onboard the entire organization onto a platform where customer centricity is key, and complete commitment to digitize the core application systems as stated by Gledhill (2018). Digitization is the core principle of Industry 4.0. Mehdiabadi et al (2020), argues that the current traditional business models are a limitation for business transformation and growth, it is therefore important to implement industry 4.0 technologies to meet their business objectives in this digital age.

Sima. et al (2020), says the idea of industry 4.0 implies the use of advanced communication technology and innovative strategies to aid with the development of production technologies. Mackhour et all (2020) further argues it is the use of artificial intelligence like robots to drive process automation, cloud computing technologies to leverage the processing capability and drive collaboration efficiency, big data analytics to optimise and streamline the internal processes, and also understanding customer behaviour to build models that offer contextual solutions, internet of things which allows the interconnectivity of things, allowing ease of information flow. Mackhour et

al. (2020) indicates that the ultimate benefit of using these technologies is aimed at transforming the economy and the society at large.

Tink (2019) argues that the introduction of technology and the rapid raise of the digital services has changed customers expectation in every facet of their lives, particularly the banking sector. Business Tech (2019) conducted a study in 2019, which revealed that South Africa has 31 million internet users, and each user spends on average 8 hours and 25 minutes online each day on any device. Virtual Incentive (2020) further argues that based on the number of people who spend hours online, customers expect businesses to interact with them over the digital touchpoints, meaning they must be reachable anytime and from anywhere.

2.3. The Evolution of Banking in South Africa

According to Li et al. (2017), Uber and Airbnb have completely disrupted the transport and hospitalization industry by offering online peer to peer platforms. Until recently with the emergence of new digital banks, traditional financial institutions were never disrupted. When emerging digital banks started, they had the same approach in terms of building a platform that will enable customer centricity by offering their products and services through digital channels. The essence of start-up digital banks is the new approach i.e. networking of smart digital devices with products, tools, robots and people while ensuring they integrate the customers successfully into the processes. This ensures greater profitability (Mekinjić, 2019).

Mehdiabadi et al (2020) describes the evolution of banking, wherein branch banking can be categorised as Banking 1.0, where in services were provided at certain times at the branch. Mehdiabadi et al (2020), further argues that with the introduction of the internet in 1980's, allowed the formation of Banking 2.0 where certain services that were offered at the branch like cash withdrawals and account balance checks were now available at ATM's, which allowed people to access these services outside the normal branch operating hours. The introduction of Smartphones coupled with the existing technological advancement of faster internet between the period of 2007 to 2015 allowed traditional banks to offer most of the services they currently offer at the branch on self-service platforms, like the Online banking and App based banking, which is categorised as Banking 3.0. Mehdiabadi et al (2020), further argues that digital banks have adopted Banking 4.0 which is characterised by intelligence decision making, high-speed networking protocols, providing customers with the personalized and integrated customer experience. Figure 1 below shows the evolution of banking.

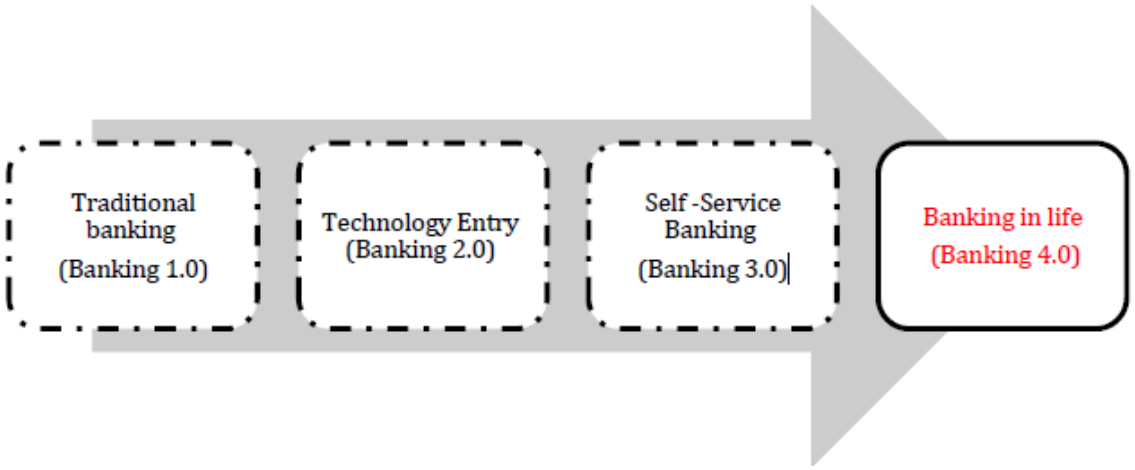

Figure 1: Evolution of Banking (Developed by Mehdiabadi et al 2020)

2.4. Traditional Banks

Traditional banking is characterised by physical buildings. A traditional bank in South Africa has headquarters and to support the operation there are branches that are located across the countries in which it operates in.

Orlando (2020) says branch banking was largely chosen for the convenience it provided in terms of giving face to face customer service. Orlando (2016) further argues that according to the Global Consumer Banking Survey (2016), approximately 60% of the 550 000 people that were surveyed across 32 different countries, preferred to go to a physical building to either complete a transaction or purchase one of the bank's product offerings. A reputable traditional bank may seem more trustworthy than banks that operate digitally without the convenience of the face-to-face interaction. However, they do not have the accessibility to customers particularly when the branches close operations at the end of business day. The operation of a traditional bank is characterized by legacy systems, manual workarounds and complex business processes which are described below.

2.4.1. Legacy Systems and Complex Business Processes

Legacy systems are often complex systems that were built on old architecture, a small change on a legacy core banking system would normally require a great deal of impact assessment to ensure there is no downstream impact on other systems that integrate to the core system Jones (2019).

Jones (2019) further argues that legacy systems normally go through a plethora of changes and have catered for so many requirements over decades. This evolution normally presents banks with challenges in terms of integrating them to other modern systems. According to industry expects, cloud and Software as a Service (SaaS) solutions are generally not compatible with older legacy systems. In order to incorporate the new solutions with legacy systems extensive customization of the code and a great deal of regression testing would be required to ensure that the integration is

successful. This is a time-consuming exercise and has cost associated with it, which the customer will have to ultimately pay.

Most traditional banks manage their solution delivery effort through a Software Development Life Cycle (SDLC) performing the following activities in each SDLC stage (Faculty 2018).

- Requirements Elicitation, gap analysis between current and future functionalities
- Analysis and design stage
- Development and execution of User Acceptance Testing
- Training and change management prior to project implementation
- Project after care, ensuring a smooth transition of the business process change.

The above requires a greater investment in time and resources to ensure the delivery is successful, this would mean if at any stage the customer need changes the agility and the responsiveness to change is not easily implementable, because of the rigid nature of how the solution delivery is managed. Customers in the 21st century generally have high expectations that need to be met in an instant, if not met the Bank runs a risk of losing customers because of their inflexibility (Jones 2019).

2.4.2. Manual Work

Traditional banks are mostly associated with manual work, a typical example is the loan application process for commercial lenders described by Validis (2021). A customer applies for a working capital loan through a paper-based application, relationship managers (front-end administrators) will often receive an application request from the customer on paper. The information on the application will be captured on the front-end system by the relationship manager and they will need to transfer the data to the back-end office administrator for capturing on the back-end systems. The manual transfer of data between the core systems can often lead to mistakes being made, heavy workload on the back-end administrators (Validis, 2021).

According to Compliance Finance (2019) In an event that the application is referred to the Credit Manager/Committee and they require the customer to cede Collateral to secure the deal. The application will be referred to the back-office administrator who will also refer the application back to the relationship manager. The relationship manager would then communicate to the customer to send the required collateral documentation. The information flow between the departments and ultimately to the customer is not real time. Often leading to a waste of time.

Compliance Finance (2019) argues that in addition to the back and forth between the customer, relationship manager, back-office administrator, and the credit manager, when the customer sends

the collateral documentation, the relationship manager will have to computerize the metadata onto a collateral management system. After that, all the documents are scanned onto a documents repository system, the documents are then indexed to associate them with different search terms to allow users within the organisation to query them at any time of need and can also be shared via the Internet. A collateral custodian will then verify the documentation ensuring that signatures have been applied where relevant. These documents are then re-stapled and stored in a vault. The working capital loan will not be paid out to the customer until the documents have been verified and vetted by the collateral custodian. Compliance Finance (2019) says this tedious process can take approximately 10 days, which as a result would be frustrating for the customer. Below is process of a traditional banking process of securing a loan that is supported by collateral documents.

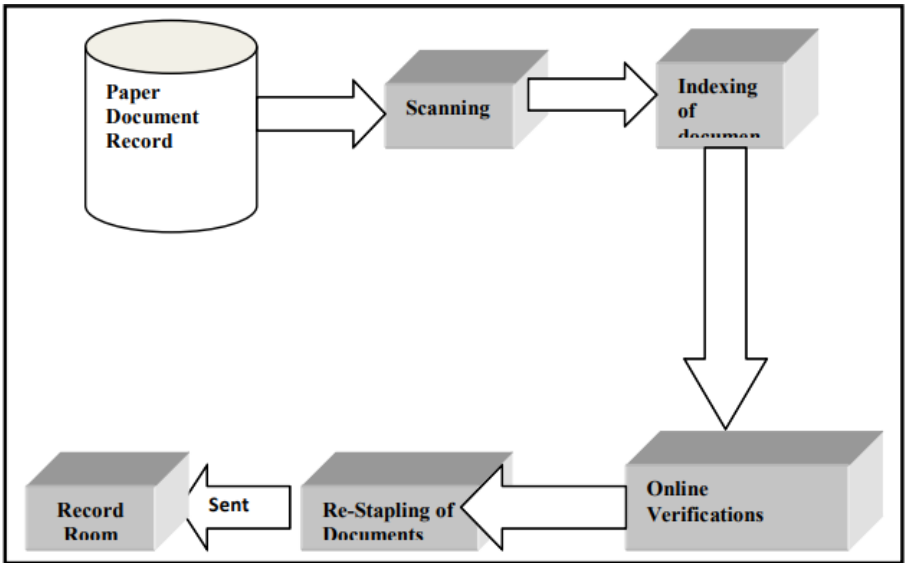

Figure 2: Traditional Banking Process for securing a loan with Collateral

(Developed by Compliance Finance 2019)

2.5. Digital Banking

PwC (2018) argues that the South African banking market will soon be shaped by the digital entrants using technology and unprecedented levels of innovation. South Africa has seen a launch of three digital banks i.e., Bank Zero, Tyme Bank and Discovery Bank. PwC (2020) further states that these digital entrants have developed a business model based on monetising customer information through carefully built communities. MyBroadband (2020) argues that each of the digital bank offer a different value proposition to their customers. Discovery bank offers a personalised experience by integrating a bank account with medical aid, insurance, vitality money which allows customers to get personalised interest rates based on lifestyle behaviour and get the benefit of financial education

through Discovery app. Discovery bank also offers their customers transactional accounts that require minimal monthly account fees (MyBroadband 2020).

Tyme Bank aims to offer easy accessibility to South Africa's unbanked and underbanked population which is approximately 11 million Mambu (2019). Tyme bank offers real time banking experiences that are unique, personalised and intuitive. Mambu (2019) argues that it has partnered with giant supermarkets i.e., Pick n Pay and Boxer to allow the bank to have access to more than 800 stores across the country and install real time biometric ATM's. This would allow customers to open Bank accounts with only their I.D numbers with no additional paperwork required a customer has access to an open and active bank account within five minutes (Mambu 2019).

Mybroadband (2020) argues that Tyme bank offers a personalised banking account that allows its customers the flexibility to link it to a GoalSave, a saving tool allowing customers to create and link a maximum of 10 saving accounts to a the main transactional account earning personalised interest. It also offers the SendMoney feature which allows customers to send money using cell phone number instead of the traditional account number. Tyme Bank offers a TymCoach app which gives customers access to their credit scores to help them make better financial decisions (Mybroadband 2020).

Traditional banks in South Africa are responding to the threats posed by digital banks through the implementing of large-scale transformation programmes PwC (2018). These are aimed at providing personalised customer experience by using the available customer data, implementing digital departments to fast-track digital transformation, enterprise-wide cost reduction programmes. However, they have had challenges in trying to rapidly accelerate the implementation of transformation programmes because of the legacy architecture and rigid business processes.

Digital banks are characterised by offering their banking services online and through a mobile application platform. Digital banks have no need for branch facilities as their services are provided using automated processes, real time updates and offering customer support through in-app chats Logan (2019). Business Tech (2017) says in a customer experience banking survey that was conducted by technology company Avaya which queried more than 10 000 banking customers in two waves, first wave was covering the UK, UAE, India and Australia and the second covering South Africa, Germany, Italy and Saudi Arabia. 30% of the respondents indicated that the most popular method for South Africans to contact their banking is through the mobile app, compared to 26% in India, 24% in UAE, 10% in France and 8% in Germany. Online banking was the second most preferred method of banking in South Africans as indicated by 26% of the respondents, and with just

18% still preferring to visit the corner street branch for simple transactions as stated by Business Tech (2017). The survey shows South Africans prefer the digital route to conduct their daily banking needs and they would rather visit a branch if they need to.

Digital banks provide users with great control and clear visibility over their finances, up to the minute spending updates, monthly reports and commission free spending Logan (2019). Over and above the flexibility that digital banks have given their audience it has greatly reduced the spending on monthly account fees and service fees which for traditional banks are linked to the legacy processes and systems. Digital banks have adopted the industry 4.0 principles to ensure that they disrupt incumbent traditional banks. Below are some of the technologies they have embraced that have worked to their advantage.

2.5.1. Implementation of Industry 4.0 technologies

This section examines the principles of Industry 4.0 that digital banks have mostly adopted to the core of their operating model.

Cloud Enabled Core Banking & Cloud Storage

According to Gartner (2011), "Core Banking Application is a system that processes daily banking transitions and posts updates to accounts and other financial records. Core banking systems typically includes deposits, loan, and credit processing capabilities with interface to general ledger systems and reporting tools" (n.p.) Core banking application is the engine that integrates with other supporting systems to facilitate virtually every transition and reporting for the bank.

Williams (2018) states that some digital banks have entrusted their core banking to cloud providers. This is done to leverage the computing, tooling, and processing power that cloud offers. Cloud generally claims to offer infinite storage, greater network capability, and data security, the security standards are amongst the highest available. Additionally, digital banks have used Application Programming Interface (API) enabled cloud-based core to use microservices to develop and integrate new applications and solutions. This allows them to be more responsive to change, allowing greater innovation and a greater reduction in costs which ultimately results in an improved customer experience. (Williams, 2018).

Mister (2019) argues that cloud storage gives bank users the ability to share and access files remotely without the need of their local storage system. Advantages of a cloud storage is the storage costs which is charged per utilisation and it is cheaper than using a physical data centre. Mister, (2019)

further argues that cloud storage is advantageous in terms of recovery, in a case where something happens to the physical data storage the company would have inevitably lost the files, however with cloud storage the files are safer.

Big Data Analytics

Reynolds (2016), defines Big data analytics as a process with which industries collect and utilize information to enhance customer experience, improve their products and services and improve operational capability of their business. Reynolds (2016) further argues that incumbent traditional banks had large amounts of data that was sitting in reservoirs and was left untapped. This is where digital banks have taken advantage and used this evolving industry 4.0 concept as one of the primary means of conducting their business**.** Digital banks use different analytical models to suit a specific purpose in their business, below are some of the analytical principles they have employed in their companies using big data analytics (Reynolds, 2016)**.**

- **Predictive analytics**

They make use of statistical models, forecasting techniques, predictive techniques, and information management to generate customer patterns which drives the future product offerings. This ensures the correct product is delivered or advertised to the correct customer timeously. Reynolds (2016) says predictive analytics is also a good tool for innovation and the ability to respond quickly to an ever-changing customer need. The ability to market future product offerings digitally is advantageous particularly with 30% of the south African population owning a smart phone and connected to the web as stated by Statista (2020), and thus allows access to information at any given time and place. This enables digital banks to adjust their products and services with flexibility depending on the feedback received from customers from all the banking products that are advertised digitally (Reynolds, 2016).

- **Operational analytics**

Digital banks use operational analytics to constantly improve the efficiency of their existing business processes. This monitors how the business operates and presents a graphical representation of the information over a specified period to the executive members of the company. When anomalies are observed in the process they are removed timeously. The information collected from the graphs is also used for future resources planning and ensuring that the business processes are streamlined (Reynolds, 2016).

Internet of Things (IoT) – Interconnectedness

Boulmakoul (2019) states that Internet of Things refers to the interconnection via the internet of computing devices that are embedded in every object which allows them to send and receive information without human intervention. Boulmakoul (2019) further argues that every object around a human being will be able to exchange information and communicate with one another. Digital banks are one of the economic actors which have taken advantage of connectivity of objects to satisfy the customers who expect a great deal of innovation from their banks by offering them appropriate products and services to their way of a connected life Boulmakoul (2019). To further support the claims stated above, Boulmakoul (2019) further states there are technical advancements which IoT have brought in the financial service industry, that new digital banks have taken some advantage of in their operations as stated below:

- **Mobile Banking**
    - **Account Management of Things** – This is a platform that most digital banks have developed to allow for easy, seamless, and instant access by consumers to all the banking services that they offer according to Boulmakoul (2019). Customers are now able to open transactional accounts in the comfort of their homes using the assistance of biometrics and facial recognition that automatically recognizes individuals based on their physical and biological characteristics. Through the digital interface between a digital bank and the Home Affairs, that data is then verified in an instant which then allows for a seamless bank account opening in the comfort of the customers home.
    - **Wallet of Things**: A wallet is tool which is used by digital banks to store money without the need for a transactional account. The wallet is particularly targeted at the unbanked market to enable them to make payments directly to any other payment terminal. This is ultimately targeted at luring the unbanked market and bringing them into the banking system where they would have bank account through the trust, they would have built over a specific period (Boulmakoul, 2019).
    - **Real time monitoring of assets**: IoT allows the bank to monitor the status and the value of the Assets that the bank has financed in real time. It is also now possible to monitor the value of the collateral items that the banks take to decide whether it is worth keeping that collateral (Boulmakoul, 2019).

Open Banking and using Application Programme Interface (API's)

Digital banks have seized the opportunities to use one of the emerging and fast developing areas in the financial services industry which is Open Banking as stated by Mehdiabadi et al (2020),. Open banking uses the Application Programme Interface (API's) to collect banking data from different sources and institutions and puts it on a single platform Mehdiabadi et al, (2020). Additionally, with the use of API's, customers have access to banking data real time, which enables them to make better decisions in terms of performing transaction, applying for credit and investing their money, as stated by Tech Funnel (2020). Customers can monitor and share their financial information with organisation withing the financial services industry and outside the industry to allow them to get better service, better investment opportunities and ease access to credit solutions Tech Funnel (2020).

Tech Funnel (2020) states that the information available on a platform provided by open banking can often be shared with authorised third-party organisations which would generally offer two types of services:

1. **Account Information services** – Providing customer with price comparison websites and budgeting applications.
2. **Payment Initiation Services –** "This could include retailers and even tech companies like Amazon"

Tech Funnel (2020) argues Open banking can be used within the financial service industry to provide tailor made solutions to individuals; it can also assist Small & Medium Sized Enterprises (SME's) to address their everyday challenges such as cashflow. Solutions such as Selective Invoice Discounting, invoice level finance where a customer has entered a contract of supplying goods or services to a third party (Debtor), however a third party has issued an invoice to pay after a certain period. Through the available information that Open banking provides, banks can offer a customer a credit facility in exchange of buying their invoice which will give them access to funds immediately. The money owed by the debtor will then be paid to the bank to cover the facility taken by the customer who initially provided goods or services to the debtor (Tech Funnel 2020).

Robotic Process Automation in Banking

One of the major facets of Industry 4.0, Robotics Process Automation (RPA). Robotics has revolutionized the banking industry. Dabke (2018) defines RPA as the eyes and the hands that uses the capability of data collection, Artificial intelligence (to interpret the collated data to follow the behaviour) and machine learning in order to automate repeated and high-volume tasks such as processing credit card orders, capturing financial statements of customers applying for credit onto a

financial spreading system and loan approval process. Dabke - (2018), further argues that traditional banks who use robotics in some of their areas have reduced staff to free them to focus on innovative solutions, which has reduced operational costs. Robots has also removed the risk of human error while ensuring compliance with the regulators and reducing the time of fixing human errors.

Dabke - (2018), States that there are major banks in the United States of America (Bank of Tokyo, CitiBank and the Bank of America) who are making the most of the Robotic Technology, Citibank harnesses the power of robotics technology by using machine learning to detect fraudulent charges based on spending history, Bank of America uses Artificial Intelligence technology "Erika" which is a chatbot that provides financial education and support through the use of predictive analytics to its customers as stated by Dabke (2018), meanwhile the Bank of Tokyo uses robots that can communicate in 19 different languages in its Branch facilities, these robots can respond to customer queries more accurately and quickly. This signifies that Banks do not need a human on the other side of the chatbot, thus they can cash in from the operational costs saving.

Biometrics in Banking

According to Agidi (2018), Digital entrants are always looking at leveraging the biometrics technology to enhance the solutions they offer and improve the security around those solutions. Agidi (2018), argues more transaction are performed through an online mobile transaction, there are however customers who are still concerned about the security measure around an online transaction. Banking transactions can be performed through a voice or speech recognition system where customers need to verify themselves using a microphone in their phones before they do any transaction (Agidi 2018).

Entersekt (2019) argues traditional banks have always wanted to increase simplicity without compromising on security This was done with the username and password login method. With customer having the flexibility to own multiple bank accounts with different banks, this means they must remember the username and password combination for every account owned and ultimately for every transaction that they need to perform. Entersekt (2019) further argues that people who own 2 or more accounts, 37% of them are likely to forget their passwords at least once a week and having to reset the password is a cumbersome process.

The better balance between simplicity without compromising security that digital banks are opting for is the use of biometrics technology. Entersekt (2019) says biometric authentication is easier and quicker way for customer to validate themselves when login onto banking applications, making

online payment, and doing cash withdrawals at ATM's. Entersekt (2019), further states that "You don't, after all, have to remember your fingerprint or type in your voice" (n.p.). Fingerprint is the widely used biometric technology in the banking industry BizTech (2018). Thanks to the introduction of Touch I.D by Apple in 2013, fingerprint recognition has been mainstream technology in mobile banking applications since then (Entersekt 2019).

Blockchain technology

Kkozyra (2020) describes blockchain technology in the banking context as open, distributed mechanism that records transactions between two parties. BBC storyworks (2021) argues that block chain allows two parties to share a ledger across a computer network without needing a third party which enables efficient transactional capability. In a study conducted in 2019 by McKinsey & Company (2019), cross-border payments totalled around $600 billion annually with an expected increase of three percent a year which is driven by international trade. McKinsey & Company (2019) further argues, processing cross boarder payments can take a few days to settle because it's limited by the way incumbent financial institutions were built, costs high fees with a result of causing customer frustration. Kkozyra (2020) says blockchain technology can be used to facilitate faster payments and lower the fees of processing these transactions. Fintech Weekly (2021) say blockchain technology brings in improved security that prevents hackers from accessing bank and customer personal information.

2.6. Optimised Business Processes

Kissflow (2019) defines process optimisation is a process of increasing Operational efficiency. An optimised business process makes businesses realize their goals. Kissflow (2019) further argues that operational efficiency has a direct impact on productivity of the business and employees. One of the main facets of optimisation is the agile solution delivery method described below:

2.6.1. Agile Solution Delivery Method

Abrahamsson (2002), describes the agile method as the ability for a business to be nimble by attempting to deliver solutions to customers asking for faster innovative products and services. Alexander (2018), further states that agile is a project delivery method that uses shorter development cycles classified as sprints to provide better output, more quickly and efficiently. The key principles of agile project methodology are as described by (Alexander 2018):

1. Customer satisfaction by delivering early and valuable solutions,

2. Change in requirements are embraced at any stage of the cycle, provided it is for customer benefit purposes
3. Delivering products and services at a higher frequency
4. Support and trust people involved in the solution delivery

The figure below shows agile solutions delivery method which is a continuous iteration of development and testing throughout the software development lifecycle

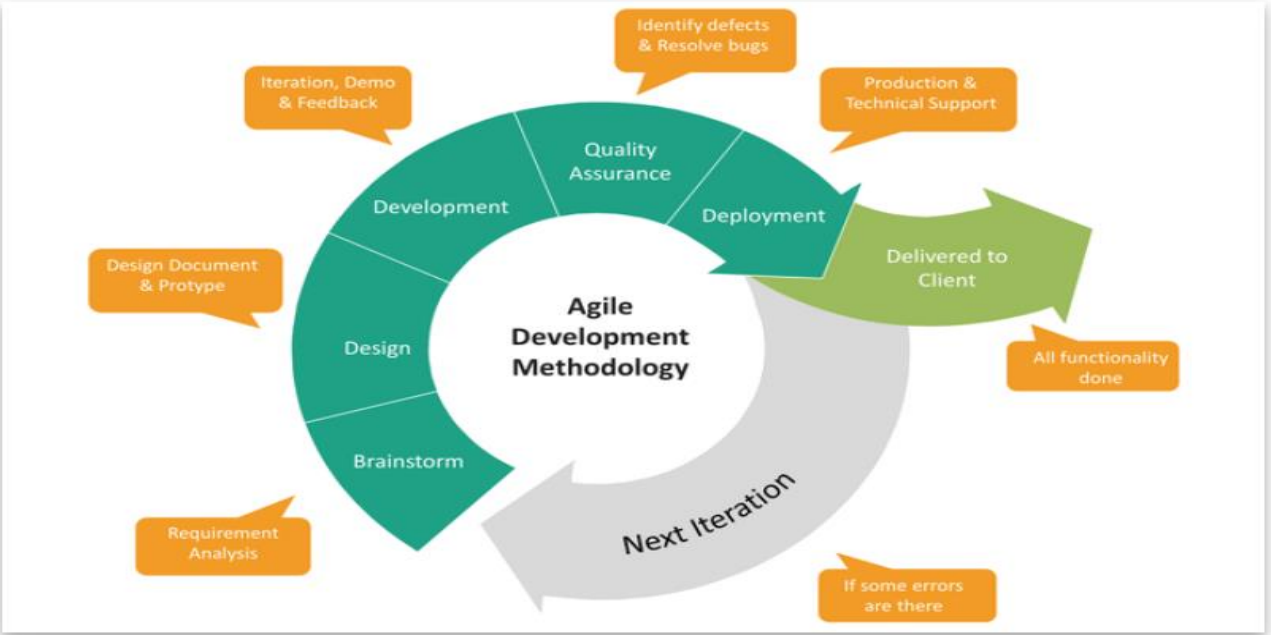

Figure 3: Agile Software development life Cycle (Developed by Orionadvisortech 2019)

2.7. Customer Position

In this age where every company is striving for customer centricity, i.e. putting the customer at the epicentre of their business models, coupled with the demanding expectation that customers have. Banks are under pressure to deliver innovative and digital solutions to a customer base that expects to transact in the comfort and convenience of their homes on their mobile phones while also paying cheaper banking fees (Williams, 2018).

According to Statista (2020) there are currently 22 million people in South Africa who have access to a smart phone and some form of internet connection, which accounts to 30% of the country's population. These numbers are expected to grow by an estimate of 5 million smart phone users by 2023. These stats have meant that bank customers can transact without having to go to the branch. The flexibility with which the customer can transact has meant that certain customers have opted to

fully migrate to digital banks which offer their products and services at a reasonably cheaper price as stated by Brega (2020).

According to News24 (2020), South Africa's first digital bank; TymeBank has reached 2 million customers in less than 2years of its operation of which 60% of their customer base are active customers. In addition to gaining individual customers the bank has also onboarded over 18 000 business customers as stated by). This strong growth in customer base can be accounted for from traditional banks. This is also an indication that as more digital banks launch in South Africa, the big four banks can expect a decline in their customer base if they do not change their operating models.

2.8. Competition

One of the substantial roles of competition in the banking industry is ensuring banks don't have monopoly power in the market, which would mean that customers will be charged exorbitant prices Posner (2016). As a result of the high pricing model, customers will be demotivated to borrow from banks which would have a negative impact on the overall competitiveness of the country Posner (2016). Banks also play an important role in terms of setting up the monetary policy of the country, as such the availability of competition ensures collaboration between banks in implementing an effective monetary policy (Fungacova et al 2013).

Haripersad R et al (2018), argues that commercial banks worldwide are struggling to maintain their competitiveness because of the introduction of digital entrants and fintech companies who have disrupted the traditional banking model. This as a result has negatively affected the traditional income streams of traditional banks. Competition in the banking sector is inevitable due to an increase in the number of banks in the South African banking market. According to ADV Ratings (2021) there are 67 banks operating in South Africa serving a market of approximately 27.4 million people aged 16 years and older, The Citizen (2020) reported that Absa lost 200 000 retail customers in 2020, with Standard bank citing a 1% drop in active customer in it's personal and business banking units.

The Citizen (2020) further argued that the customer decline is specifically at the entry level personal and business segments for both banks. The entry level segment is where these banks are facing the most intense competition from Capitec as well as Tyme Bank which provide customers with better pricing. It is therefore for this reason why traditional banks are starting to streamline their internal

processes with the aim of adopting a competitive pricing model and service quality as strategy retain their existing customer base in South Africa (Haripersad et al 2018).

2.9. Initial conceptual Frame-Work - Characteristics of a digital bank

Figure 4 below illustrates a high-level view of the operating model for a digital bank. Digital banks have digitized all the traditional banking processes that were initially available to the customer in a physical branch. According to Biswas (2019) this is done to improve the operational ease of the organisation. The customer is placed at the epicentre of the digital model. As illustrated below; cloud enabled core applications allow customers to invariably transact without being charged a monthly account/ service fee that is normally associated with the maintenance of old legacy system for traditional banks. Additionally, the interconnectedness of the model through (IoT) allows for ease of information flows, which can also be collated by the analytics team to predict future product/service offerings and allows them the flexibility to respond to any change that would be needed with ease to constantly ensure customer satisfaction and loyalty. Below is the developed initial conceptual framework:

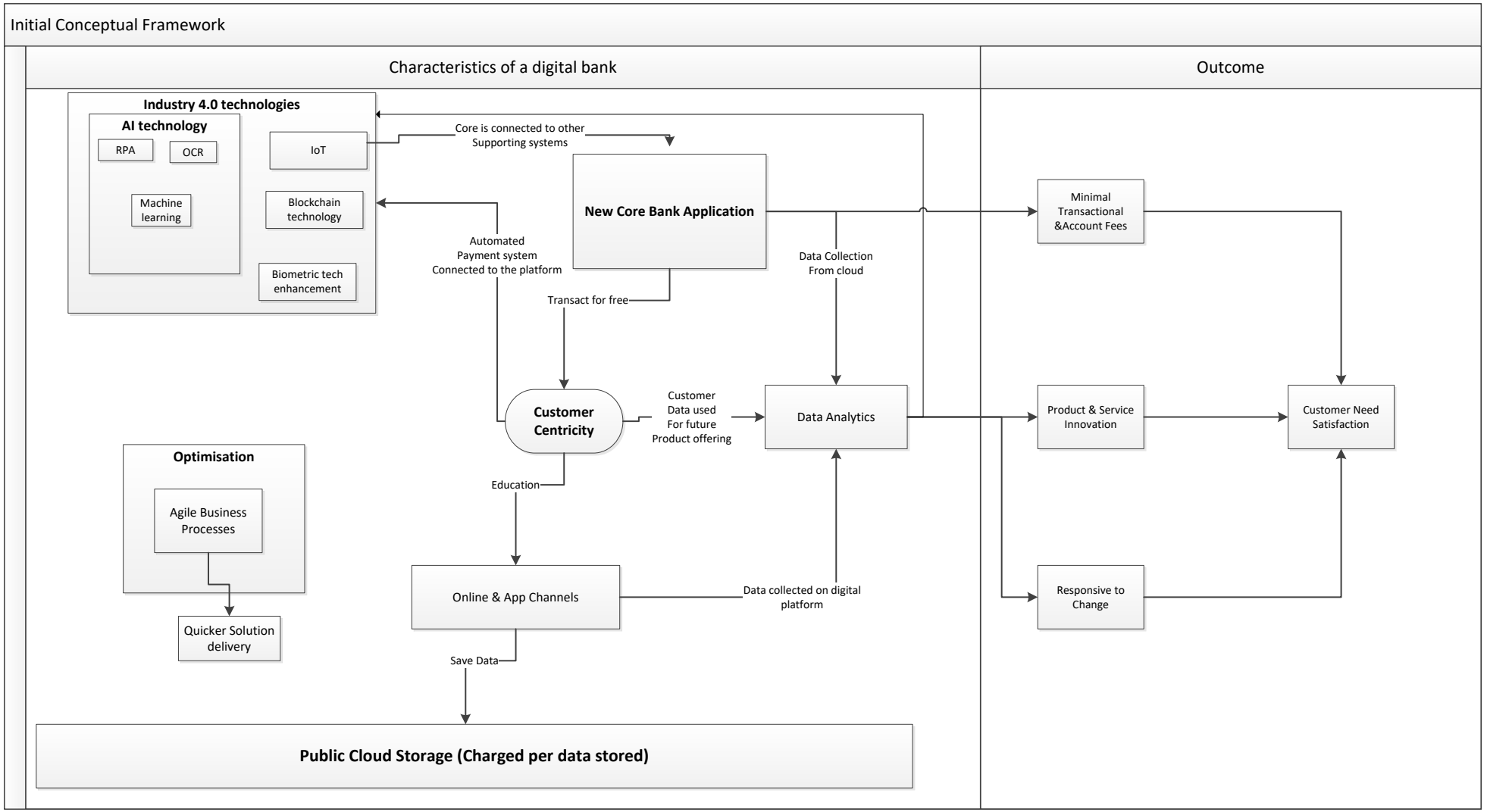

Figure 4: Initial Conceptual Framework (Developed by the author)

Chapter 3

3. Research Methodology

3.1. Introduction

This chapter outlines the research method that has been used to collect data for this study. In more detail this chapter was broken down into the following sub-segments; research design method, then data collection method followed, sampling method that was used, research process that was followed, data analysis procedure that was followed, the reliability and validity to ensure that the research is valid and reliable, and lasty the ethical considerations.

3.2. Research design

To address the critical research question and achieve the objectives listed above, a qualitative approach was chosen for this project. This approach was chosen because it gives an in-depth understanding of the phenomenon being explored where little information exits Tiley (2017). With this approach participants can freely disclose their experiences and beliefs without any constraints Tiley (2017). The adoption of Industry 4.0 technologies in the commercial segment of Bank A is still relatively low, as such the design of this research shall be deemed exploratory. Semi structured interviews were conducted with Subject Matter Experts (SME's), wherein interview questions were drawn from the initial conceptual framework drawn in the literature. This was done to determine what the commercial segment of Bank A can do to remain competitive in a market disrupted by digital banks. Themes were determined from the subjective opinion of SME's who are experienced and have a vested interest in the technological advancement brough about by industry 4.0. The developed themes were then compared to the literature to draw up discussions and conclusions of the study.

3.3. Research Instruments

For the purposes of this research, semi structured interviews were used to explore the subjective views, experiences, beliefs and or motivations of SME's in the phenomenon being explored as a data collection technique. This Instrument was chosen because it allows the collection of open-ended data that gives an depth understanding of the participants thoughts, feelings and beliefs regarding the phenomenon being explored DeJonckheere et al (2019). Wengraf (2004) further argues that the purpose of semi-structured interviews is to connect facts in a phenomenon that is explored with the

subjective views and experiences of SME's that will be interviewed. A semi structured questionnaire was used as an interview guide for this research, wherein certain questions were prepared so that the interview was guided towards the satisfaction of the research objectives, additional questions were then developed and asked during the interviews.

Data was collected through the recording of the interviews and transcribed on a word document. The interview was done once with each of the SME's across Bank A's Commercial Division which were covered for approximately an hour through virtual meetings on Microsoft teams. Open ended interview questions were developed based on the conceptual framework presented in the literature review. To ensure an optimum use of the interview time, questions were sent to respondents prior the interview so that they can familiarize themselves with the questions and also to ensure that the interview is focused on the desired outcomes (Pharm, 2014).

To develop interview questions the study used Wengraf (2004) Pyramid Model of interview research. From the Critical Research Question that has been developed, interfacing with the use of facts that have been drawn from the literature, several theory questions were developed. Subsequent to the theory question, interview questions were then be drawn from the theory questions, and lastly non-verbal interview questions were developed, below figure is an illustration of the interview process that followed.

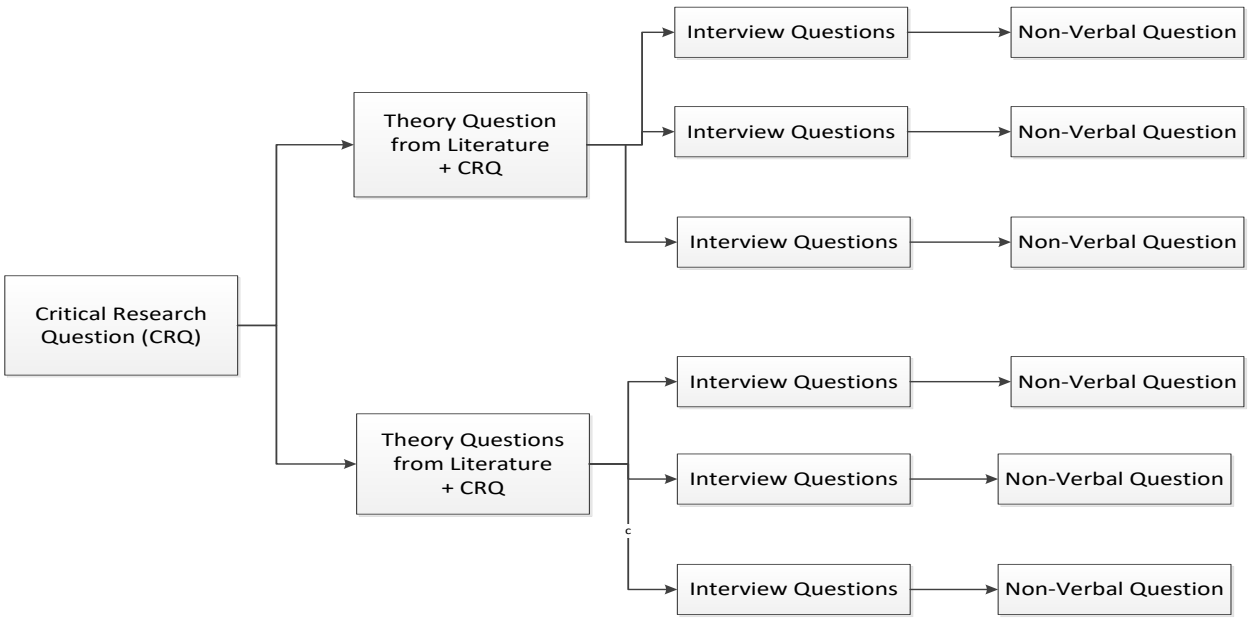

Figure 5 **:** Pyramid Model on how the interview questions were developed (Wengraft, 2004)

The conceptual framework drawn in the literature was used to derive exploratory questions on how the commercial segments of a traditional Bank A can bridge the digital divide brought by digital banks, to ensure they retain their customers. Based on the open-ended question that were asked, participants were given an opportunity to narrate their responses. Requiring themes were developed based on the narrated responses from all participants and finally the developed themes were then be compared to the initial conceptual framework on a top down method.

Below are interview questions that were developed from the critical research questions

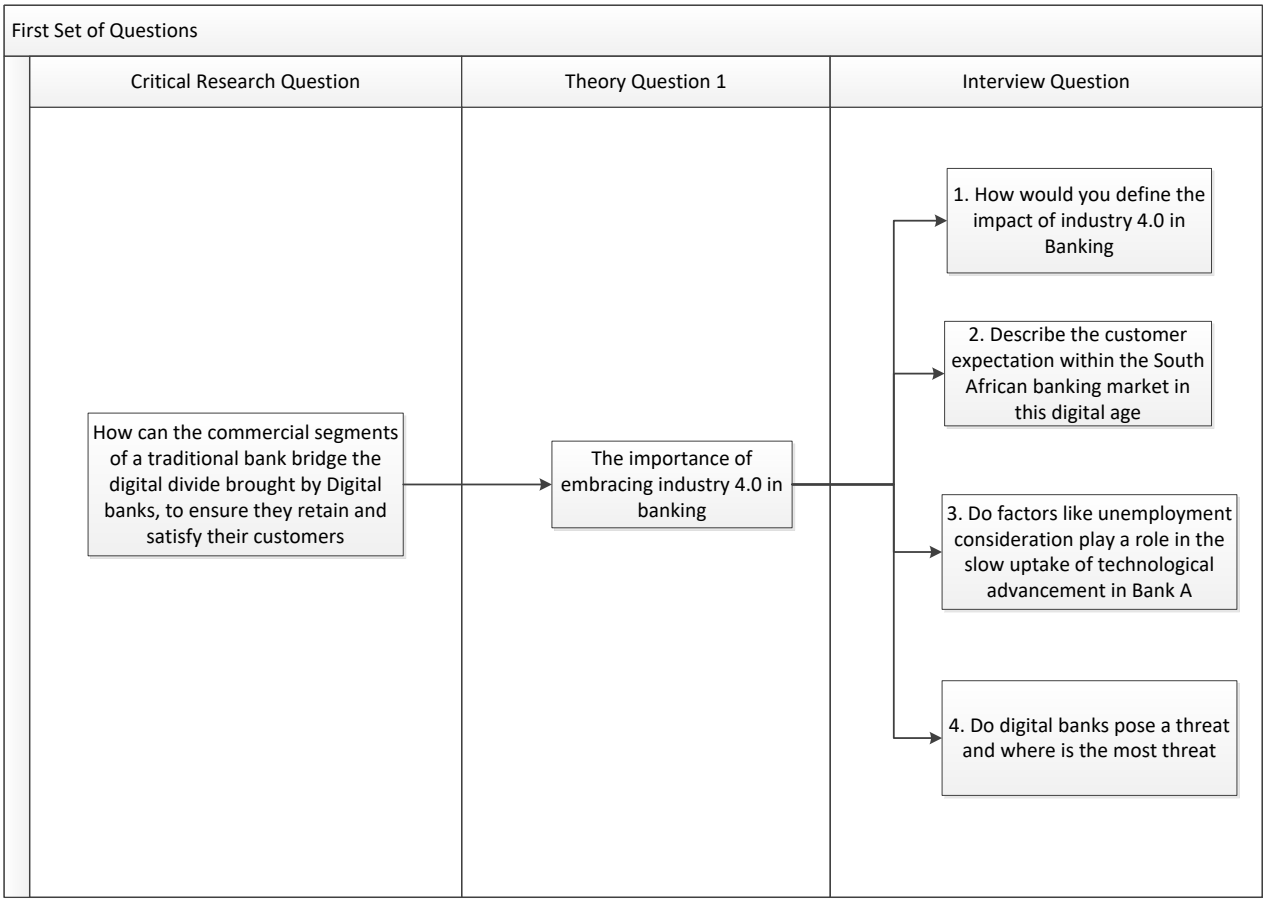

Figure 6: First Set of Questions

The second sub-set of question where developed based on the current architecture i.e. Legacy Core Banking Application and the Data Architecture

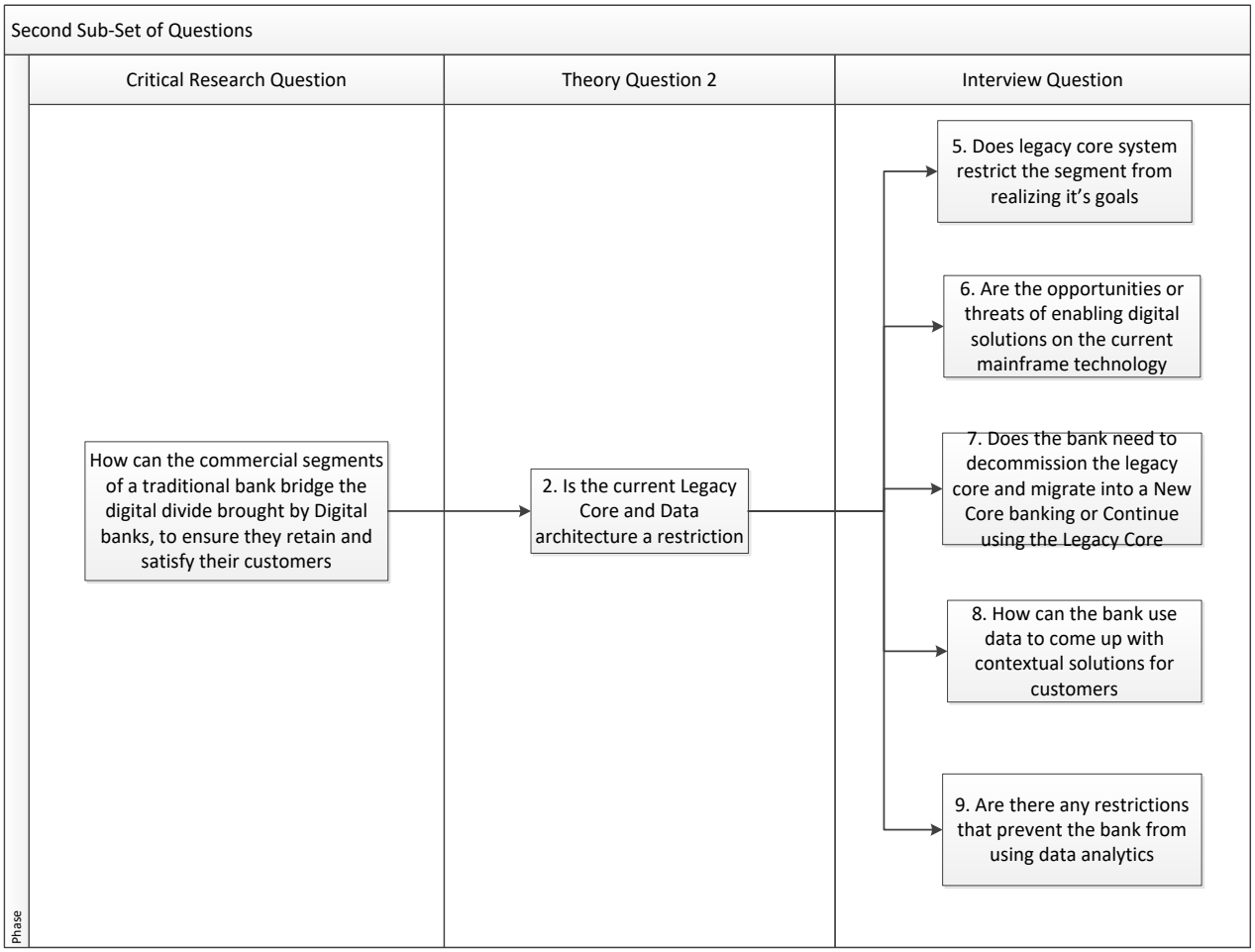

Figure 7: Second set of questions

The third of question were developed based on business process optimisation to drive operational efficiency and reduce costs, also highlighting the importance attracting the unbanked community and retaining the current set of customers.

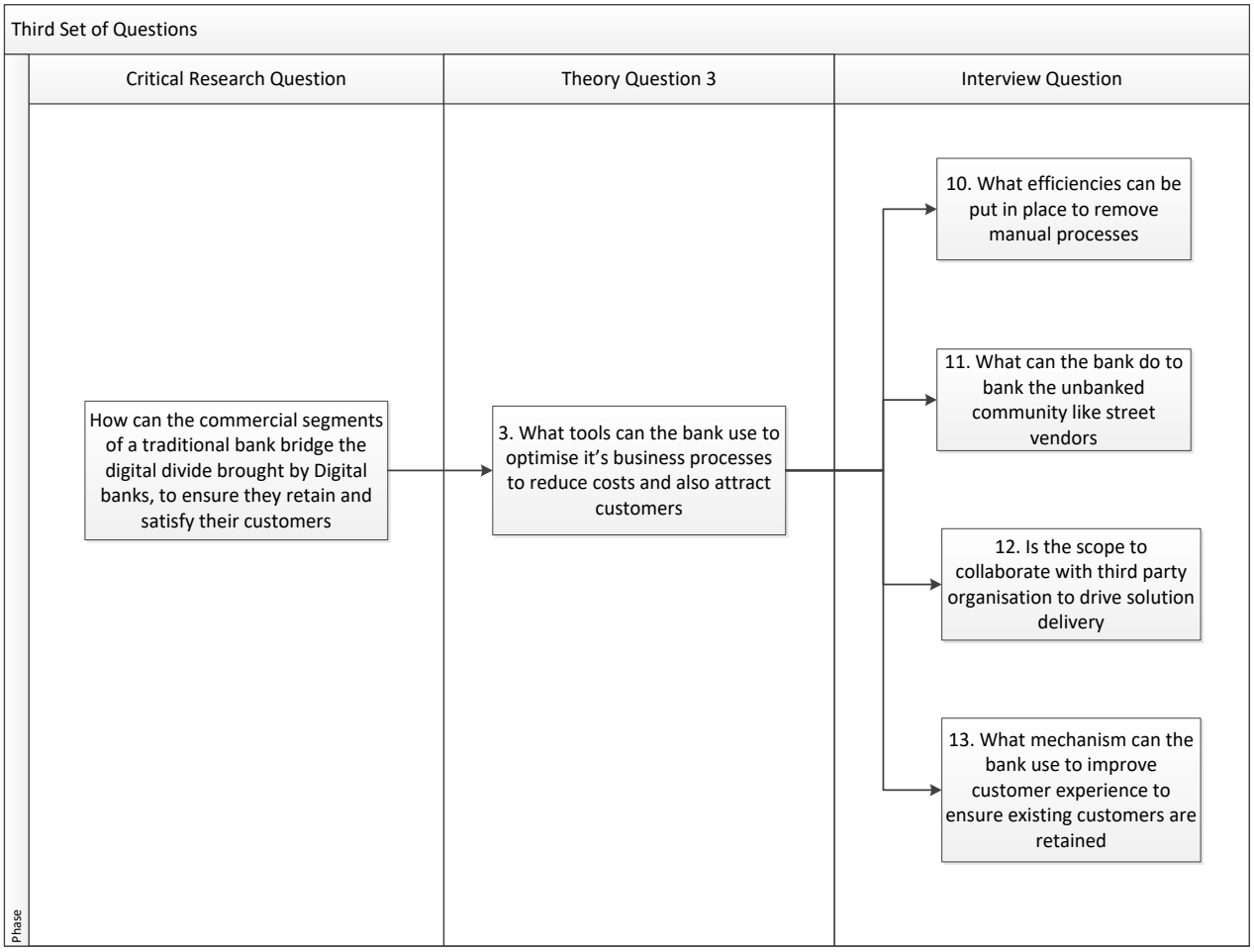

Figure 8: Third set of question

3.4. Sampling

Purposeful sampling was used as a sampling technique of the research under discussion, as according to Lawrence et al. (2013) this type of technique ensures that individuals selected to participate in this study are especially knowledgeable and experienced about technological advancement brought about by industry 4.0 coupled with the understanding of the future strategy of Bank A's Commercial division in terms of ensuring that business banking remains competitive.

Subject Matter Experts were selected as a sample size in Bank A's Commercial division. The SME's included head of departments, business solutions head, product manager and systems owners who are knowledgeable and have vested interest in the technological advancements which are brought about by industry 4.0. According to Palinkas et al (2016) their ability to articulate their subjective views based on their experience in an articulate and reflective manner. Additionally, this technique brings an opportunity for a possible inclusion of new perspectives on the phenomenon being explored

as stated by Palinkas et al (2016). Eight interviews were conducted in Bank A's Commercial division:

- Two Interviews were conducted in the Commercial Business Space
- Three interviews were done in the Project Office
- Two interviews were done with I.T
- One interview was done with the operations team (Lending Fulfilment Department)

According to Namey (2017), conducting an interview-based study on a specific research question, generally little new information is generated after interviewing more than six people, as such this leads to data saturation as described by Faulkner et al (2017). Eight interviews that were conducted in this study.

3.5. Data collection

Emails, Microsoft Teams chats were sent to SME's of Bank A to gain their acceptance to participate in this research study. The nature and the scope of the study was explained to the SME's prior to scheduling interview meetings to ensure that they comfortable with the nature of the study with respect to their roles. Interview meetings were held Virtually on Microsoft teams to the convenience of the respondents. The interviews lasted approximately 45 to 50 minutes. Interviews were recorded to the permission of the respondents and notes were taken in order to help analyze the gathered data. During the interview process participants were free to deviate slightly from the topic of discussion to allow the conversation to flow effortlessly. The following were taken into consideration to protect the respondents:

3.4.1. Letter of consent

A letter of consent was sent to participants to reassure them that their participation in this study is voluntary and that their free to withdraw at any time without negative consequences, additionally it was mentioned to them that their identity will be treated with confidentiality.

3.6 Data analysis

Data was collected and presented in a word document against each question. Coding method was used to highlight important words and sentences that are deemed to meet the objectives of the study Saldaña (2015). The codes were documented in an excel spreadsheet to interpret and analyze them, through analysis the codes where then categorized based on a recuring pattern and their similarity.

Thematic content was used as an analysis technique in this study, wherein recuring themes were identified and grouped together based on the categorization of data. A comparison of the themes developed with the literature was done to derive the discussion points. The six-step process was used to ultimately develop themes from recurring patterns in the information that was generated from respondents (Caulfield, 2019) is outlined below:

1. **Familiarization** - getting to know the data that was collected prior to the analysis being done. This was done through reading the interviews.
2. **Coding** – Collected data was pre-coded by highlighting and underlining significant information that relates the objectives of the study Saldana (2016), the highlighted information was then grouped into categories. Figure 9 below shows the diagram that was as a guideline to code data into categories and themes

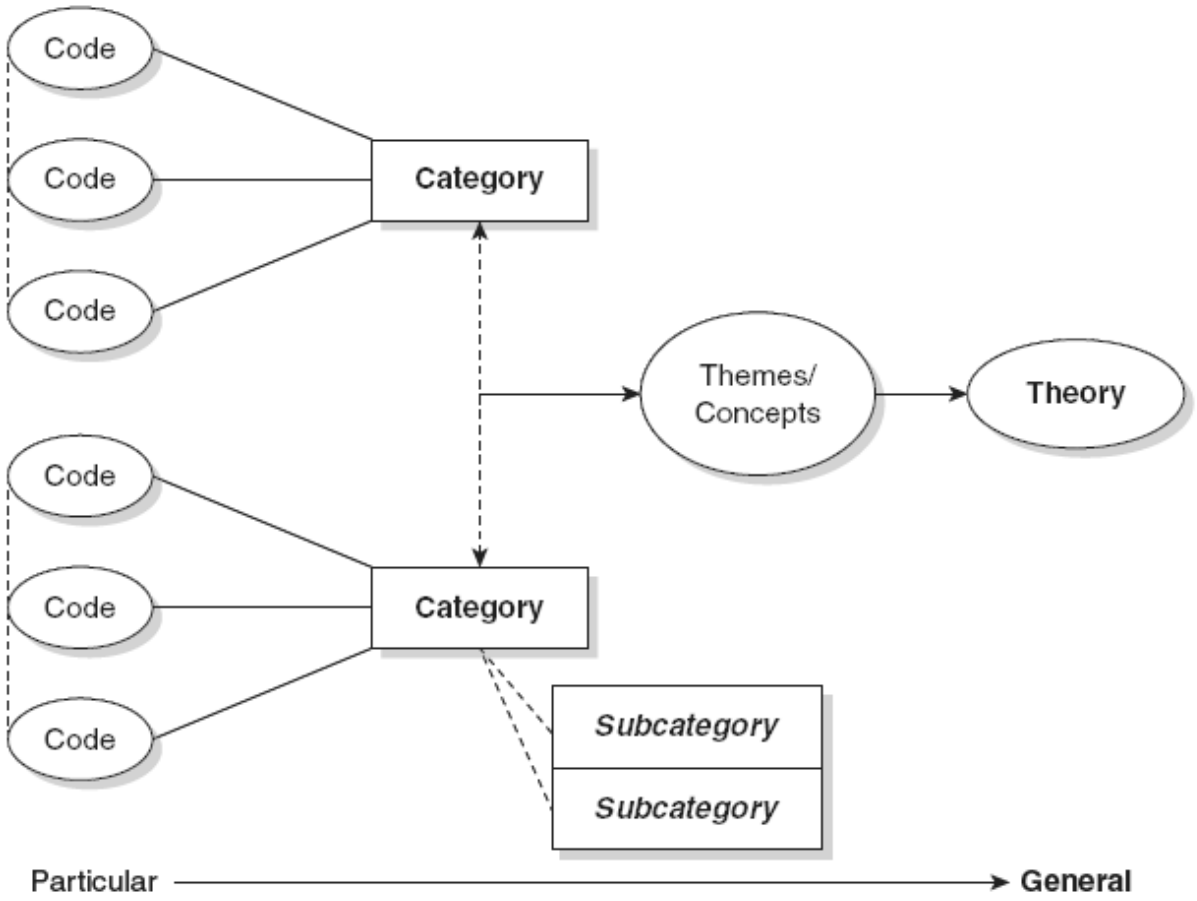

Figure 9: Coding technique (Developed by Saldana (2016))

3. Sentences and specific texts were identified and arranged in a systematic order to look for concepts and ideas

4. and codes to describe the content will then be developed. Each code will describe an idea around the text.

5. **Generating themes** – Codes created will be looked at to identify any patterns among them. For any recurring patterns, themes will be developed.
6. **Reviewing themes** - Themes that are developed will then be compared to the actual data to see if anything is missed.
7. **Defining and Naming Themes –** Finalizing the themes and formulating exactly what they mean and defining how the themes define the data that was collected.
8. **Write up –** Analysis of the data will be written down. Where the introduction and the objectives of the research will be tied into the themes that were developed.

3.7 Validity and Reliability

Heale (2015) says reliability and validity co-exist, the researcher describes validity as the extent to which a concept can be accurately measured in a particular study, whereas reliability refers to the repeatability in terms of getting the same results when the research is repeated under the same conditions. For this study, research methods are clearly documented and easy to follow, additionally all Interview questions are documented clearly and thoroughly, and the evidence of the data collected is presented in this research report appendices. Data was analyzed using Microsoft Excel and Word and was made available in this report

3.7.1 Validity

To Prove validity of the study, the study adheres to the following concepts: construct, internal and external validity.

Construct Validity

Questions were developed based on the initial conceptual framework which was derived from theory drawn in the literature. Data was obtained from the eight interviews conducted with subject matter experts in the commercial segment of Bank A, data analytics was performed on the results obtained and recuring themes were developed. The themes that were developed relate to the initial conceptual framework with the addition of new themes that emerged.

Internal Validity

Scribbr (2020) describes internal validity as a concept that makes conclusion of a causal relationship credible and trustworthy. A triangulation method was used to ensure the validity of the research study. field notes were taken in an observational manner in the commercial segment of Bank A, the notes taken were triangulated with the responses given by experts to derive the confidence of the findings of the study.

External Validity

Scribbr (2020) refer external validity to the generalisability of the research results from the sample population to a wider population. Scribbr (2020) further argues that external validity can be influenced by several factors:

1. Population Characteristics

The selected sample size for this research must have the same characteristics as the greater population to which the research findings will be applied. In this research study, the sample population consisted of eight SME's that have more than ten years of experience and have a vested interest in the technological advancements that industry 4.0 brings. The analysis reveals that the sample population has an average of more than ten years working in the commercial segment. The researcher believes that the sample population was clearly defined as the findings can be applied to other populations of different segments within the bank.

According to Scribbr (2020 there are threats to external validity when using remittances to influence the findings of the research, these may not be representative of the wider population to which the research findings are generalized. In this research study, no remittances were offered. There was, therefore, no danger of the sample population wanting to participate for monetary reasons or of subject distorting the data in order to attract attention to themselves.

Participants may change their behaviour which leads to results that are distorted. In this research, all data collection methodologies, instruments were included as part of the study and participants were given the impression that their responses were used for feedback and academic purposes only.

3.7.2. Reliability

Scribbr (2020), defines reliability as the consistency of the results obtained from a research study. This research study ensured reliability by ensuring conformance to the following: credibility, transferability, and dependability.

Credibility

StatisticsSolutions (2021) describes credibility as a concept of linking the research study findings with reality to demonstrate the truth of the research study findings. Credibility through Triangulation was explored

Triangulation method was used wherein multiple data sources and data collection methods was used; field notes were taken by means of observation. A comparison between the raw data from the interviews and the field notes was done to draw accurate conclusion, therefore credibility through triangulation is achieved.

Transferability

According to Lincoln et al (1985) transferability is the degree to which the representation and findings are applicable beyond a particular setting. Lincoln et all (1985) further argues that a qualitative research seeks transferability by providing the details of the phenomena and setting in forma accounts like reports. To achieve transferability, research method and processes were clearly documented, data collection method was also clearly defined therefore providing a thick description in terms of analysing the data so that conclusions can be made. This would enable the transferability of the study beyond the commercial segment.

Dependability

Lincoln et al (1985), describes dependability as the shared common constructs by which a research account can be assessed. This concept looks at how the findings can be confirmed by ensuring a degree of replicability. The researcher has provided evidence of the research process and the findings in the appendix.

3.8. Ethical consideration

The research study was subject to ethical clearance from the university through the School Ethics Committee. This was done to ensure the protection of the respondent's identity, subjective views and opinions on this study. As indicated, all participants provided their written acceptance about their participation in this research study by reading and understanding the participation information sheet and signing the letter of consent. Contained in the letter of consent was a reassurance that participation in this study was voluntary and that they are free to withdraw from it at any point and for any reason.

Participants were informed about the objectives of the research and they were reassured that their responses will be kept confidential and only used for academic purposes for the purposes of this research study. During interview meetings, a climate of comfort was created to ensure that participants are free. Ethics number MIAEC 115/20

Chapter 4

4. Analysis and Results

4.1. Introduction

Chapter four presents the outcomes of this research study. For this study, thematic analysis was used where the interview data was coded and grouped into similar categories and all similar categories were grouped into themes. Raw data was obtained through in-depth interviews that were conducted with each participant. Field notes were also taken in an observational manner.

4.2. Participants

Eight participants from Bank A' Commercial segment were selected to participate in this research study based on their experience and interest in the technological advancement that industry 4.0 brings. To obtain diverse views that cover the entire spectrum of the segment, participants were selected from different departments within the segment.

The below figure shows the participation percentage per department within the commercial segment

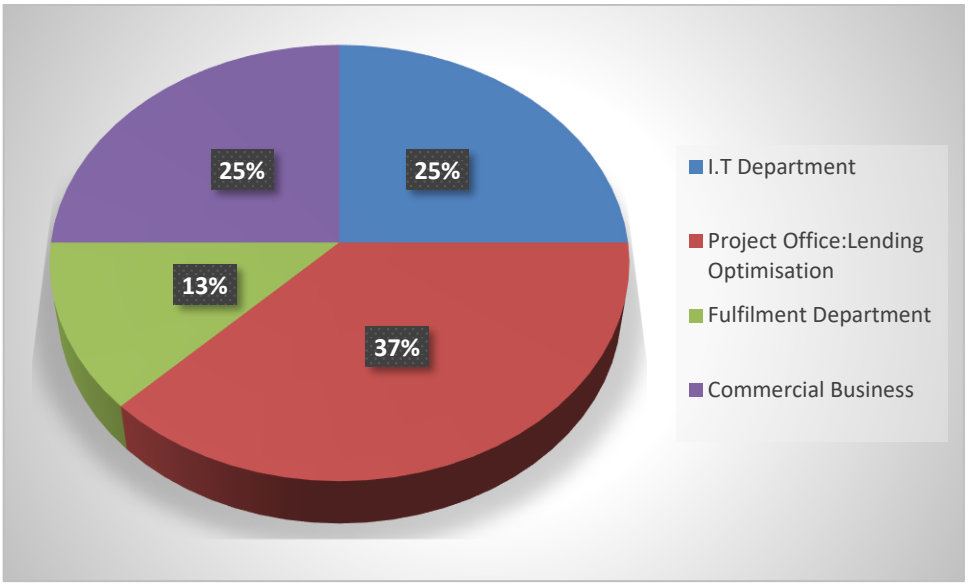

Figure 10: Participant selected per department

Participants consisted of Head of Departments, Business Solutions Head, Product Manager and Systems Owners; participants list is given below. To protect the identity of the participants a pseudonym was used for each participant.

Table 1: Interviewee list

Participants (pseudonym)	Department	Current Role	Years of Experience
Respondent 1	Fulfilment	Head of Operation	10
Respondent 2	I.T	Head of Operations I. T	10
Respondent 3	Project Office	Solutions Architect	15
Respondent 4	Commercial Business	Business and Sales Head	12
Respondent 5	Project Office	Business Solutions Head	38
Respondent 6	Project Office	System Owner	34
Respondent 7	I.T	Systems Analyst	11
Respondent 8	Commercial Business	Product Owner	10

4.3 Findings of the study

The figures below present an analytics process that was used to develop the themes. The process is divided into five analytical processes. Analytics one to four was done to develop 2nd level codes – Categories/Sub-Themes. Analytics five groups all the 2nd level codes into one in order to derive the main themes of the study.

Figure 11 below represents analytics one which was done on the first set of questions that were grouped under the same conceptual framework. First level coding was done from the raw data, to make it easier for identification a colour was associated with each specific code on the first level coding column. All items of the same colour were grouped together to form 2nd level coding which are Categories/ Sub-Themes. The analysis leading to the below diagrams can be seen in appendices.

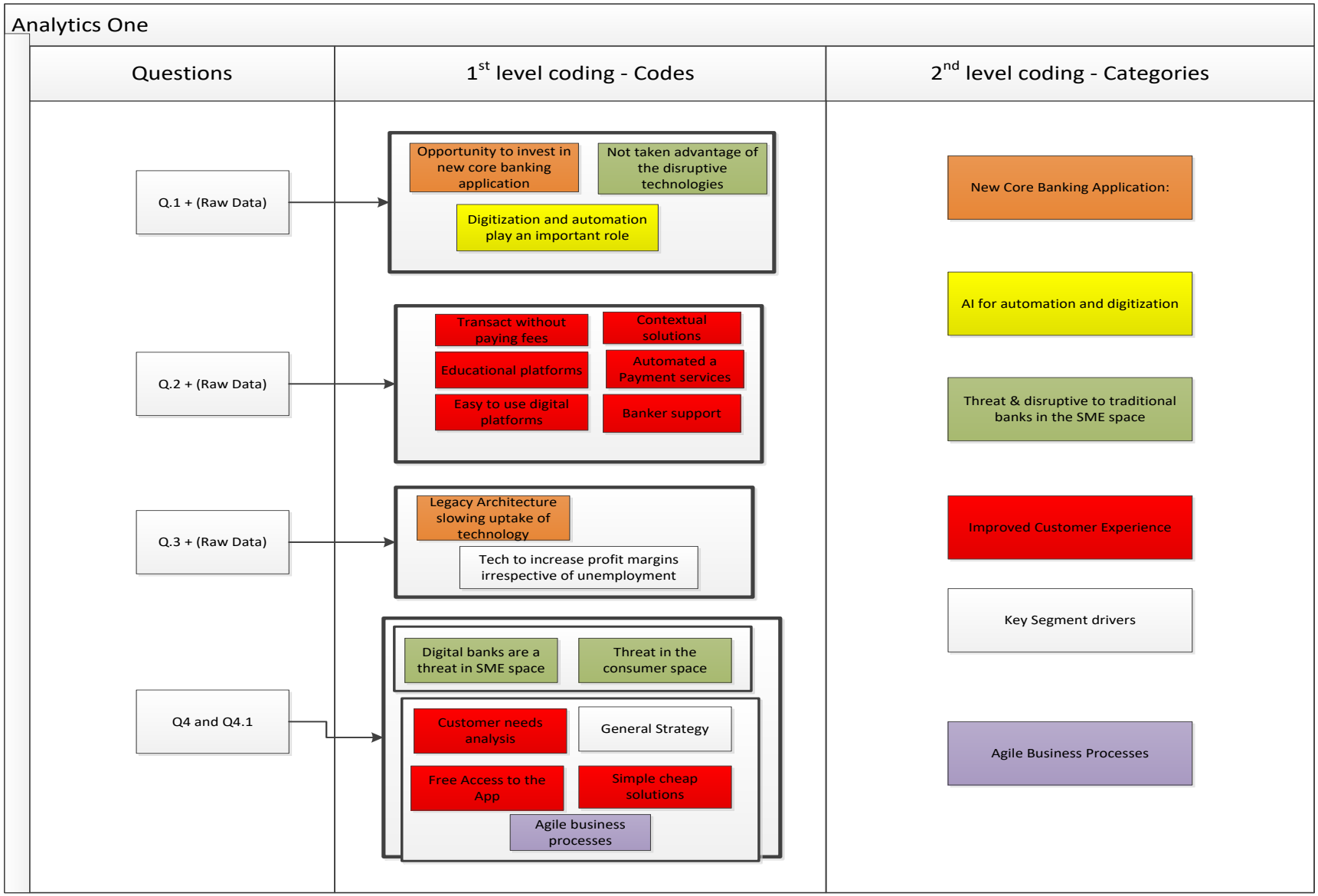

Figure 11 Analytics One

Figure 12 below represents analytics two which was done on the second set of questions that were grouped under the same conceptual framework. First level coding was done from the raw data, to make it easier for identification a colour was associated with each specific code on the first level coding column. All items of the same colour were grouped together to form 2nd level coding (Categories/ Sub -Themes)

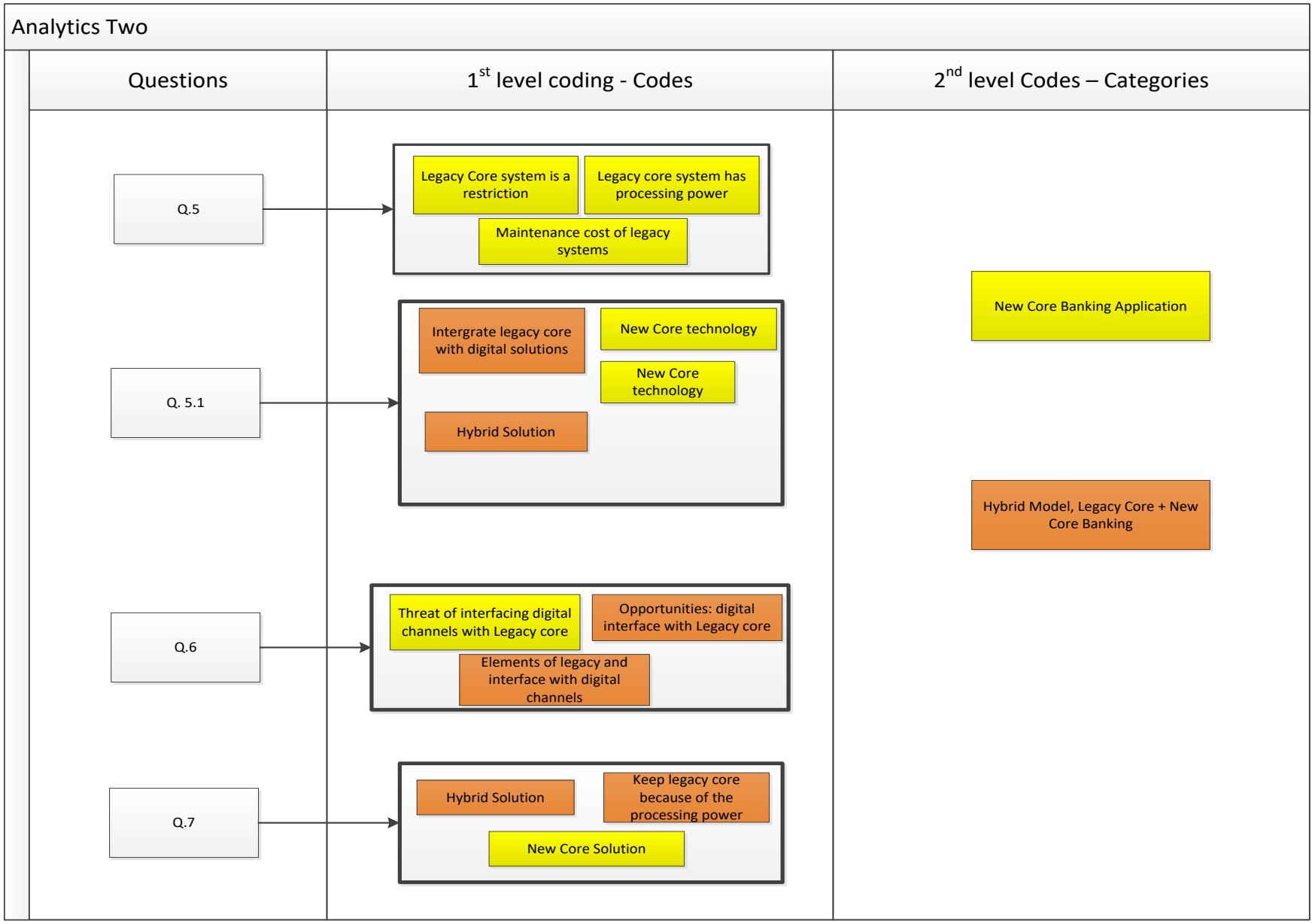
Analytics Two
Questions
1st level coding - Codes
2nd level Codes – Categories
Q.5
Legacy Core system is a restriction
Legacy core system has processing power
Maintenance cost of legacy systems
Q. 5.1
Intergrate legacy core with digital solutions
New Core technology
New Core technology
Hybrid Solution
Q.6
Threat of interfacing digital channels with Legacy core
Opportunities: digital interface with Legacy core
Elements of legacy and interface with digital channels
Q.7
Hybrid Solution
Keep legacy core because of the processing power
New Core Solution
New Core Banking Application
Hybrid Model, Legacy Core + New Core Banking

Figure 12: Analytics Two

Figure 13 below represents analytics three which was done on the second set of questions that were grouped under the same conceptual framework. First level coding was done from the raw data, to make it easier for identification a colour was associated with each specific code on the first level coding column. All items of the same colour were grouped together to form 2nd level coding (Categories Sub- Themes)

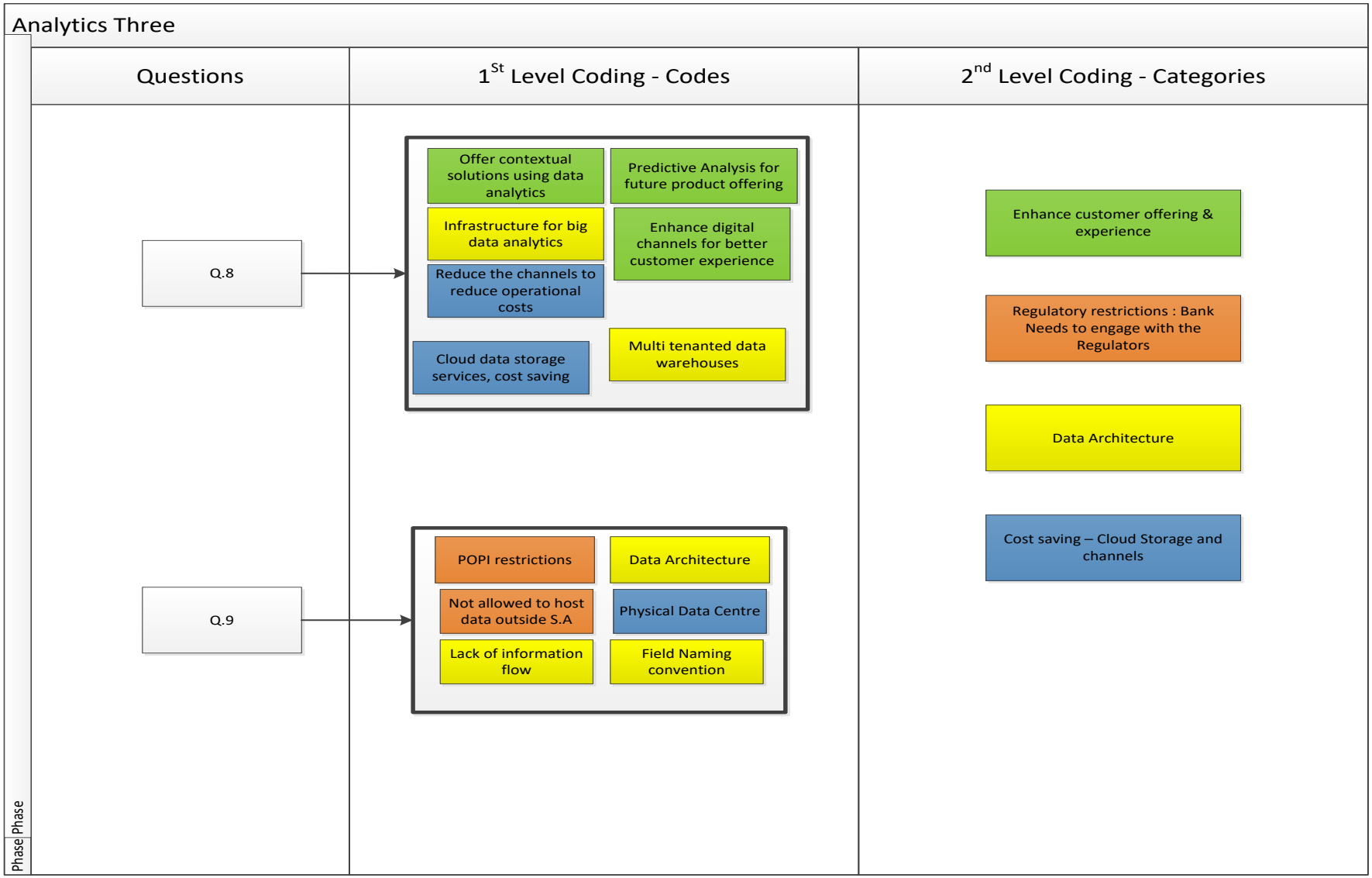

Figure 13: Analytics Three

Figure 14 below represents analytics four which was done on the second set of questions that were grouped under the same conceptual framework. First level coding was done from the raw data, to make it easier for identification a colour was associated with each specific code on the first level coding column. All items of the same colour were grouped together to form 2nd level coding (Categories /Sub-themes)

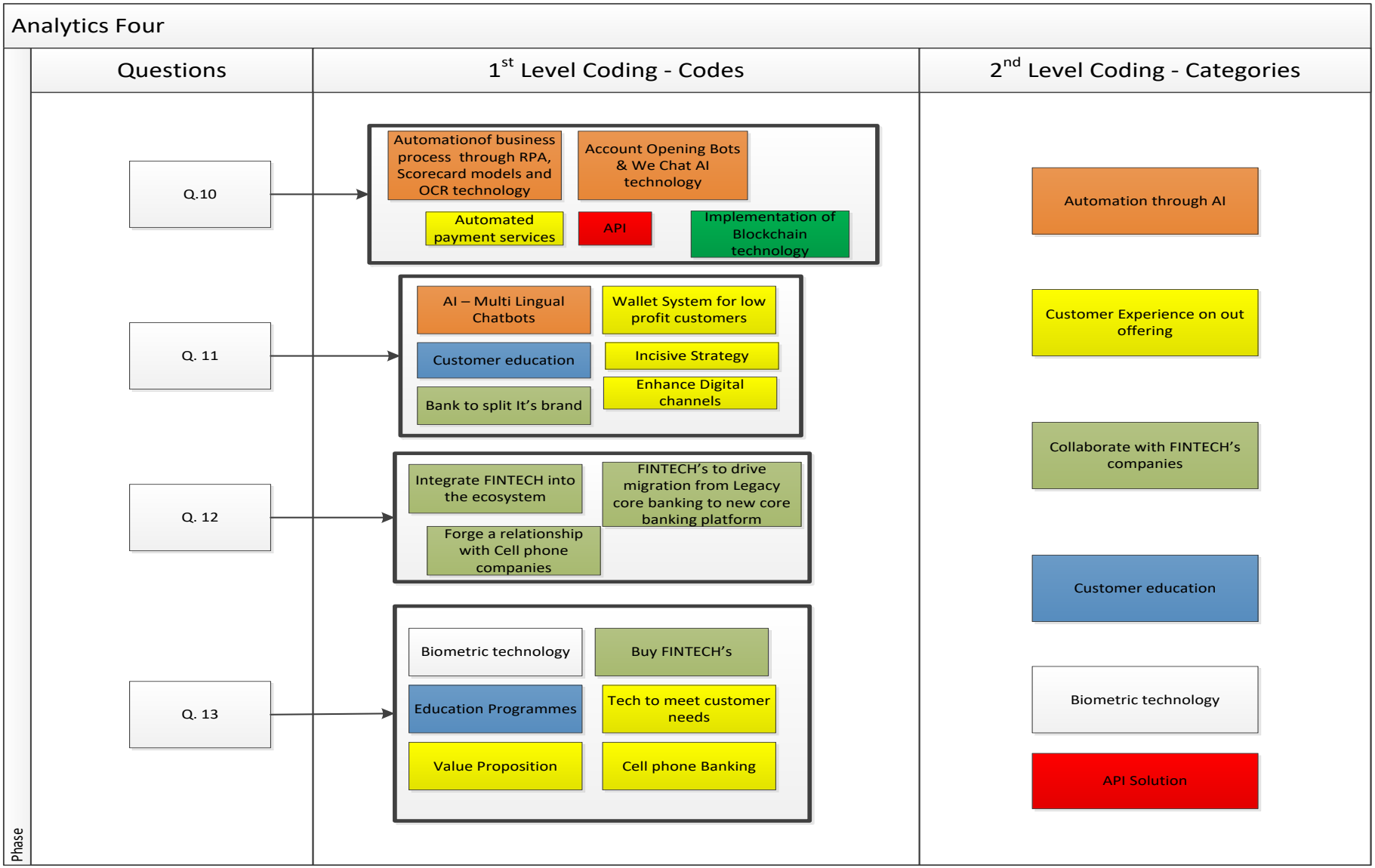

Figure 14: Analytics Four

To develop recuring themes for the study, a new set of colour combination were used. All the 2nd level codes/Sub themes were grouped across all the analytical question, repeating codes where then grouped into third level coding which are the themes. This is shown in Figure 15 below

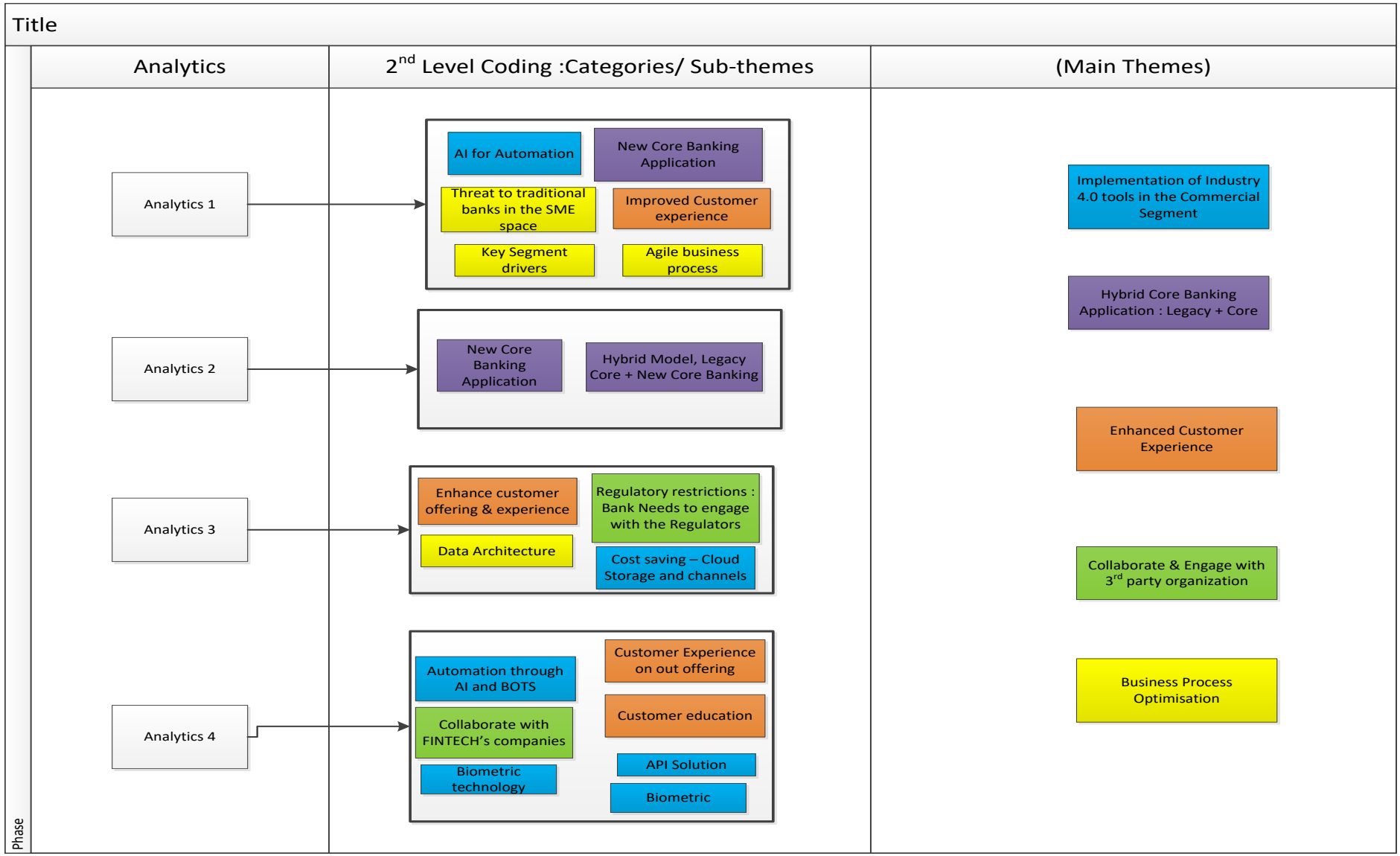

Figure 15: Developed Themes

4.3.1. Themes and sub-themes of the study

This section outlines the sub-themes and themes that were developed as part of the data analysis

As part of the research, preliminary question about the impact of industry 4.0 were asked upfront and below are the general deductions:

Respondents 1,3 and 8 say that industry 4.0 provides an opportunity for the bank to invest in the new core banking application to easily integrate with digital solutions.

Respondents 2, 3,4,5 and 7 agree that industry 4.0 has changed and revolutionized banking, with digitization and automation being the core at improving customer experience

Respondent 1,6,7 agree the bank has not taken full advantage of industry 4.0 technologies, with respondent 8 sharing the same sentiments in that industry 4.0 has been disruptive to traditional banking models

4.3.1.1. Theme One: Implementation of Industry 4.0 technologies in Commercial segment

This theme focuses on the relevant industry 4.0 technological tools that the commercial segment must implement to reduce costs, improve productivity, efficiency, and flexibility to compete with digital banks and other incumbent banks. These tools are categorised into sub-themes based on the value they will add to the segment.

The below figure indicates the analysis done to determine which of the industry 4.0 technologies do the SME’s think should be implemented.

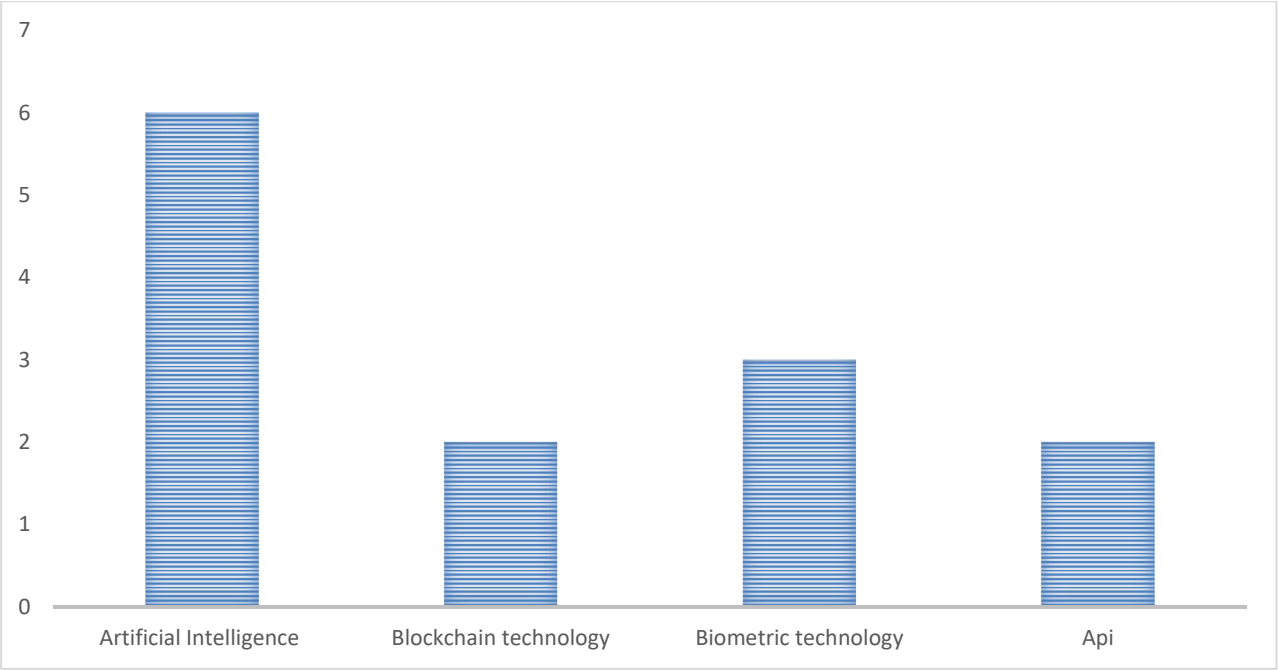

Figure 16: Industry 4.0 tech to be prioritised for implementation (Developed by the author based on Interview Results)

4.3.1.1.1. Sub Theme 1: Automation through Artificial Intelligence:

Automation is one of the key drivers of industry 4.0, this sub-theme focuses on the automation manual processes within the segment.

Respondent 1, 3, 4, 5, 6 and 7, which is six of the eight participants agree that the bank should invest in AI technology to remove most of the manual and labour-intensive processes that the bank has. Respondent 1, 4 and 7 further state the bank should invest in Robotics Process Automation (RPA) to optimise repetitive processes. Respondent 5 says the segment has two sets of customers that it caters from a business credit application and credit decisioning point of view, which are:

- Simple Customers – Respondent 5 classifies simple customers as commercial customers applying for a credit facility between 0 – 7 Million Rands
- Complex Customers – Which are classified as commercial customers applying for a credit facility greater than 7 Million Rands

Respondent 5 indicates that when simple customers apply for credit facility, it goes through a scorecard model and provides automated credit decisions to customers. However, when complex customers apply for credit, it goes through a judgemental credit process wherein a credit committee makes a judgemental decision, the process often takes long for a credit decision to be made.

Respondent 5 says the bank should automate most of its judgemental credit decisions that are taken by a credit committee by building appropriate scorecards models, this will reduce the bank's operational costs and reduce the workload on credit managers, also allow the bank to repurpose some of the employees to focus on innovative projects.

Respondent 6 states that the bank should be looking into cutting out the middleman by implementing the Optical Character Recognition (OCR) technology to automate the need of an analyst having to manually capture customer financial statements when customers apply for credit facility. It will also effectively allow quicker credit decisions to be made and improve the segment's data quality.

According to respondents 3, 5 and 8, operating a branch facility is associated with large operational costs, which is paying for; rentals, water, electricity, staff salaries etc. The three respondents agree that the bank must reduce the operational costs by reducing the number of branch/call centre interaction through the implementing AI technology that can assist customers with profile and account opening process with minimal human intervention. Respondent 8 further states that We Chat messaging should be implemented to support any query resolutions that customer have regarding their accounts. The respondent argues this will effectively lessen the number of people who make use of call centre and branch facilities to solve their queries.

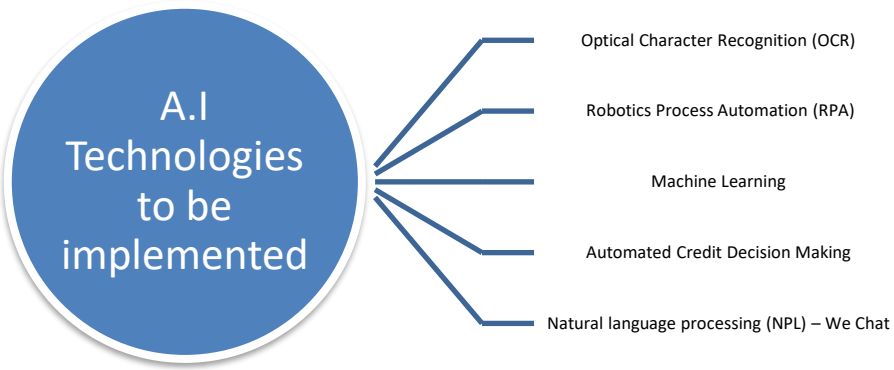

Figure 17: AI technology to be implemented (Developed by the author based on interview results)

Respondents were asked whether are there any considerations like unemployment which ultimately slows the uptake of technology, particularly automation in the commercial segment of Bank A.

Respondent 1, 2, 3, 5, 6, 8. All agree that the slow uptake of technology is not because of the fear of retrenching people or the general unemployment rate that the country is facing, respondent 5 and 8 further argued that old legacy architecture is the reason why the bank is slow in embracing some

of the advancements that this revolution brings, and the bank should try every effort to create a competitive architecture in so that it doesn't lose customers.

Respondent 1,4,5,6, 7 and 8. share the same sentiments; in that the bank needs to continue with implementing technological advancements to reduce operational costs, drive operational agility to increase profit for the business irrespective of the unemployment consideration. the respondents argue that after the implementation of technology and people can always be repurposed to other roles that align to technological advancement introduced by industry 4.0.

4.3.1.1.2. Sub Theme Two: Implementation of Blockchain technology

This sub-theme focuses on the implementation of blockchain technology to ensure better security in the bank's software infrastructure and to lower the operational costs associated with doing cross boarder and cross currency payments.

Respondents 1 and 2, state that to date the bank has no functionality that talks to how it deals with blockchain technology because of the legacy core banking system which is too old. With respondent 1 saying the segment should be implementing blockchain to improve its software infrastructure security from hackers, which would prevent hackers from accessing transactional data or divert transaction information, additionally the technology would help the bank to protect customer personal information from hackers. Respondent 2 says the bank should implement blockchain technology much like how smaller banks do to facilitate cross boarder and cross currency payments and remove the need to have a third-party bank to facilitate and settle cross boarder payments. According to the two respondents, cross boarder and cross currency payments costs the bank and that costs is ultimately pushed to the customer.

Respondent 2 further argues that this technology brings the added advantage of improving the customer experience as these payments can be settled instantly. The current process of processing and settling cross boarder or cross currency payments may take a day or two, which may lead to customer frustration.

4.3.1.1.3 Sub theme Three: Public Cloud Storage

This sub-theme focuses on the operational cost saving and flexibility of storing data onto a cloud as opposed to a physical data centre.

Respondent 2, says the bank is set up with a physical data centre wherein it orders thousands of terabytes, which it could only be using 20% of the storage ordered. From a cost point of view the bank must pay for the storage ordered. The respondent further argues that for the bank to benefit from a cost saving point of view, it would need to migrate its data into public cloud, wherein the providers charge for the storage that has been used instead of the actual storage size created. Over and above the cost saving that the bank would benefit from, storing data on the cloud provides the bank with the flexibility to integrate with other Fintech companies.

4.3.1.1.4 Sub theme Four: Biometric Technology

This sub-theme focuses on the security and protection of customer information and improving customer experience.

Respondents 1,3 and 6 argue that biometric technology is a critical tool in terms of improving the current customer experience. Respondent 1 states that for a highly illiterate economy like South Africa's one where people can't read and write, the bank should invest in mobile payment solutions like Alipay which will allow customers to pay with their face. According to the respondent Alipay would provide a better user experience than having to navigate through the banking app and reading instructions that they potentially won't understand. Respondent 3 and 6 agree that the bank should continue improving its biometric technology to allow ease of access onto the bank's digital channels, with respondent 6 further saying that to help improve the experience of customers signing suretyship on behalf of other legal entities. The bank should implement biometric technology to allow customers to sign suretyship with their fingerprint stamp, instead of sending documents through a courier company for a wet ink signature, which has an effect of delaying loan payments.

4.3.1.1.5 Application Programming Interface (API Solutions)

This sub-theme focuses on data sharing to allow for information flow by enabling inhouse systems to interface with other inhouse systems and external systems seamlessly. The implementation of API solutions leads to operational efficiency.

Respondents 3, 4 states that although legacy core systems are not a restriction for the bank, it is however important that the bank moves away from the business functions, which are interface layers that are currently used to integrate the legacy core to other internal systems within the bank, to a more current solution which is the API solution. The API solutions provides flexibility in allowing the core system to integrate with other external systems to the bank, which effectively allows for efficient and seamless information flow.

4.3.1.2 Theme Two: Implementation of a Hybrid Core Banking Application

This theme focuses on the implementation of a hybrid core banking system, which is a combination of new core banking application with the legacy core application to leverage the new technology with the processing capability of complex solutions that has been catered for on the legacy core banking application.

An analysis was done to evaluate whether the legacy core banking application is a restriction for the commercial segment with the results presented in figure 18 below:

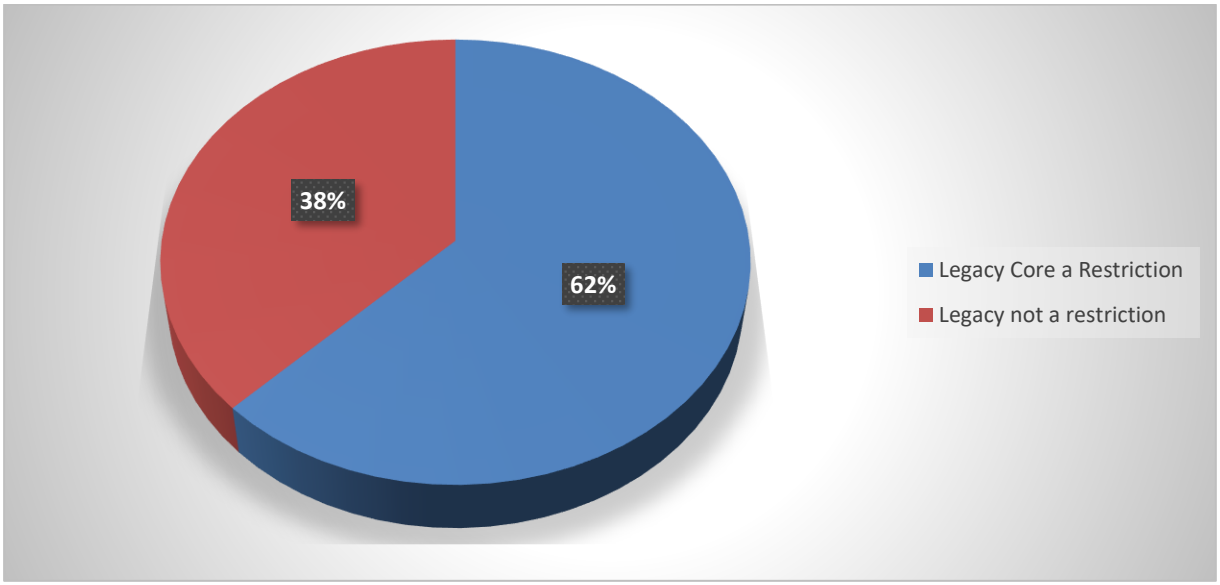

Figure 18: Legacy core Analysis

Respondents 1, 2, 5, 7 and 8. agree that the legacy core banking application which is also referred to as mainframe technology is a restriction in the commercial segment. The restrictions range from inflexibility to drive quicker solution delivery to having challenges in terms of interfacing it to the digital platforms. Respondent 5 indicates that when the mainframe technology was bought there was never a thought of it interfacing with the digital channels, because 30 years ago digital channels never existed. As such the respondent argues the bank should move to new core banking application which is built to seamlessly interface with the digital channels. Additionally, Respondents 5, 6 and 7 agree that legacy systems are expensive to maintain, although respondent 6 states that the bank might be able to meet some of its customer needs with the legacy core system, however the respondent argues that mainframe technology is expensive to run.

Respondent 3, 4 and 6, argue that legacy core systems are not a restriction because of the processing power and speed with which it is associated with. Respondent 6 further argued that it might be easier

to give customers what they want because the bank has an existing infrastructure that its leveraging of, instead bringing in new technology.

Respondents 3 and 4 argue that to compete with the digital banks, the bank needs to find an optimal way of interfacing legacy core system to the banks digital platforms and to the latest technological advancements available. Respondent 8 argued that the bank may take more than ten tears to move away and decommission the mainframe technology, as such it should optimise the use of the current resources until it can fully migrate into a new core banking application.

Based on the 62% of the population who think legacy core banking application is a restriction to commercial segment, a further analysis was done to determine whether the bank should decommission the legacy core banking application and move into the new core banking application.

In response to whether the bank should decommission the legacy core system to realize its goals in a challenged environment. An analysis was done and presented in figure 19 below:

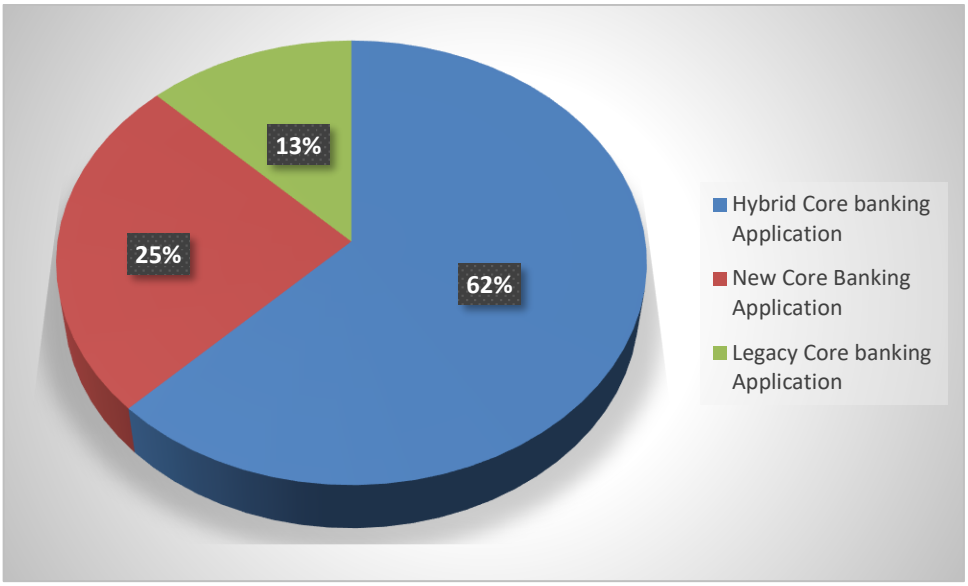

Figure 19: Analysis into which Core Banking System should be used

Respondents 1,2,4, 5 and 6 agree that the bank should be looking at implementing a parallel type of approach by implementing 2 banking core systems. i.e. new core banking which provides the flexibility required in the digital age to cater for customers with simple needs like the small and medium enterprises customers of which digital banks pose the most threat on, and continue using the legacy core system to cater for complex needs. Respondent 5 argues the bank must move to the

new core banking application; however, it should also use some of the good components from the legacy core and build it on top of the new core banking application.

Respondents 1 and 4 state that the bank should implement a new core banking application to cater for the low profit customers. This will allow the bank the flexibility of not charging customers heavy monthly account and service fees which is pushed to customer because of the maintenance costs associated with mainframe technology.

Respondent 3 argues that the bank must keep the legacy core system as a result of the processing power and the ability to provide complex credit solutions like debtor finance which businesses and corporate companies often need. The respondent further argues that the bank can interface the legacy core with external systems and digital solutions using the application programme interface that the bank should be building.

Responded 7 and 8 agree the bank should move away from the legacy core banking application into new core banking application to provide the bank with the flexibility required to compete with the digital banks. Respondent 5 shares the sentiments, however the respondent argues, the legacy core will still be with the bank for the next ten years, what the bank could do in the interim to ensure they maintain their competitive nature, so to take some of the good components from the legacy system that are critical and build it top of the new core banking application.

4.3.1.2.1 Sub Theme two: Threats of enabling digital solutions on legacy core banking application

This sub theme focuses on the threats and opportunities of enabling digital solutions and interfacing it with the current legacy core banking application to further determine the need for a change

Figure 20 shows the threats and opportunities evaluation of interfacing digital solutions like app and online on the legacy core.

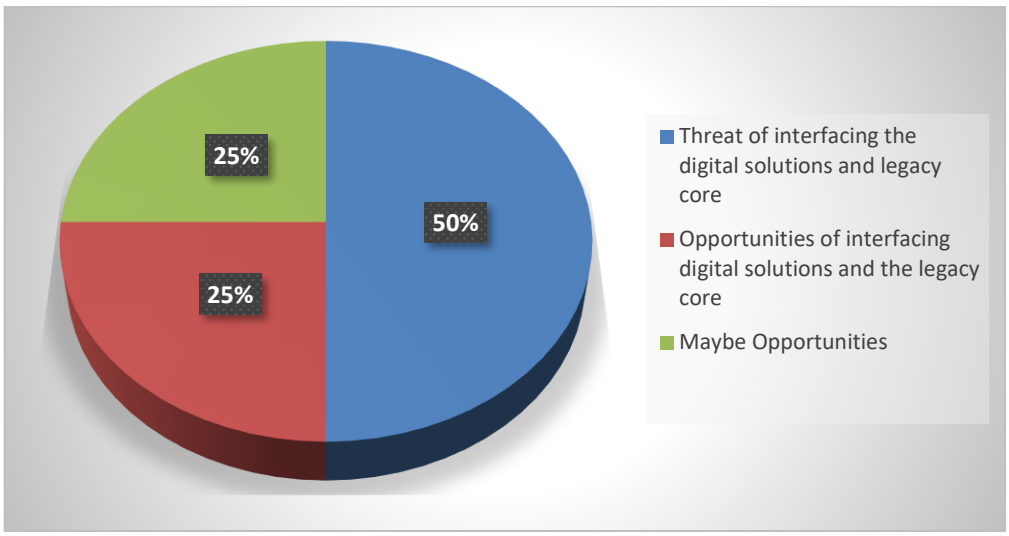

Figure 20: Threats and opportunities of enabling digital solutions on the legacy core

Respondents 1,2,6 and 7 which is 50% of the participants agree that there are threats of enabling digital solutions on the current legacy architecture. Respondent 7 putting emphasis on the technical debt the bank has inquired because of interfacing digital solutions on the current legacy core banking application. The respondent further argued that changing a single component on the legacy technology often impacts other components on the same system, often solutions are delivered and these items are never picked up, which means the technical team has to spend some time trying to fix the impacted components. Responded 7 argues that the time spent on fixing the previous issues rather than focusing on the new and innovative projects leads to technical debt.

Respondent 6 states that legacy core limits the flexibility of quicker solutions delivery and enabling something like a QR scanner to withdraw money would take about 3 months for the bank to implement it. However digital banks can implement such a technologies in a couple of weeks because of the flexibility of using new technology core.

Respondents 3 and 4, which is 25% of the respondents argue that there are opportunities of interfacing digital solutions on the current mainframe technology, with respondent 1 saying the bank should use the best of both worlds, i.e. processing power and capability of the mainframe technology and interfacing it with the new type of technology which is app, online and the java type of application. Respondent 4 saying interfacing digital platforms to the mainframe technology is not a threat, because no one has ever said the legacy sore is unstable.

Respondent 5 and 8 which is 25% of the participants state that although the bank may need to decommission the legacy system, it will however not happen in the near future. As such, the

respondents argue that in the interim the segment can take certain components of the mainframe technology that works well and interface it with digital platform, then maybe that that will bring more opportunities for the bank.

4.3.1.3. Theme Three: Improve Customer Experience

This theme focuses on enhancing customer experience to ensure that they are happy with all the touchpoints of the segment. Ensuring customers are happy drives growth, happy customers tend to transact more and easily promote the bank by telling other people about the service and the product offering. Customer satisfaction is now dependant on the personalised interaction the bank has with its customers. There are sub-themes associated with improving the customer experience to ensure the bank maintain the current set of customers and attract new set of customers.

Figure 21 below shows the customer centricity which drives the value of customer enhancement.

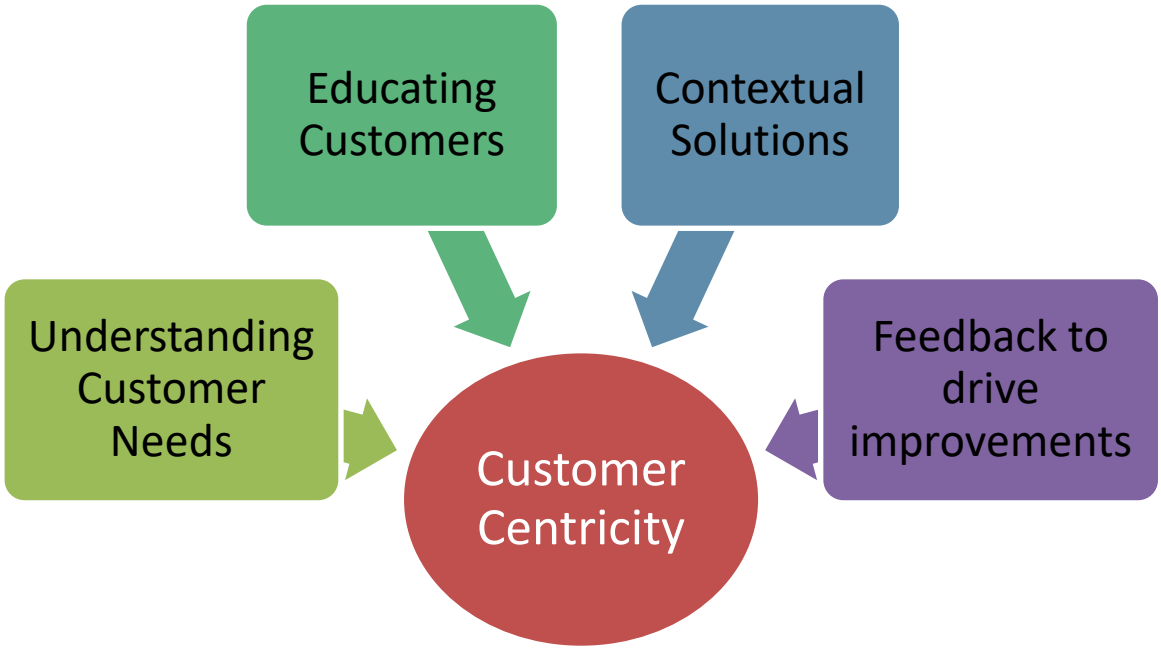

Figure 21: Customer Centricity Diagram (developed by the author)

4.3.1.3.1. Sub Theme: Understanding customer needs to provide contextual solutions (Data Analysis)

This sub-theme focuses on the importance of understanding customer needs to provide contextual solutions and also exceeding their expectations through future product offerings.

Respondents 1, 5 and 6 say the bank should invest in resources to better understand customer needs, respondent 1 argues the bank's data is disparate which prevents it from making real time decisions about the customer. Respondent 5 indicates that the bank had already started working on some of the propensity models to determine when a customer needs a credit product, the respondent argues the bank should accelerate the implementation of this model in order to realize the full benefit of providing existing customer with contextual credit solutions. Respondent 6 says customers generally don't know what they want, it is therefore the responsibility of the bank to build models that can match what the customer need.

Respondents 4, 7 and 8 indicate that based on the models created to understand each business need, the bank can start offering contextual solutions which are specific to each business or individual. The respondents argue that currently the bank offers products that customers qualify for, irrespective of whether the customer needs a product or not. The bank would pre-score qualifying customers from a credit solution perspective and offer them products that they generally do not need. Respondent 8 argues that the bank should partner up with supermarkets who directly interface with the customer from a transaction point of view. This would enable the bank to understand customers transaction and spending behaviour which can ultimately assist the bank in building the right models that will enable customer specific solutions.

Respondent 2 and 3, argue that the bank should pre-empt the future need of customers. The respondents argue that the bank should aggressively accelerate the implementation of predictive analysis for future product offering, as this would qualify as exceeding customer expectations which is important in the current challenged business environment.

4.3.1.3.2. Sub theme: Feedback to drive improvements

This sub-theme focuses on the need to drive constant improvements based on the feedback received from customers.

Respondents 2 and 5 agree that the bank should use data to enhance the digital platforms based on the interactions that the customers have with the different channels the bank has i.e. Branches, Call Centre and digital platforms. Respondent 2 argues payment services should be enhanced as part of the general user experience, wherein when a customer is paying a certain supplier every month on the 25th, instead of making the customer go through the normal payment process, it would be beneficial to have a function like that automated based on the interaction the customer has with the digital channels.

Respondent 5, says the bank has large overheads because it has all its products out there on multiple channels, including branches. The respondent argues it is important to use the feedback provided by customers based on the product take up per channel to offer the right solutions on the appropriate channels. The respondent further argues that if majority of customers are not taking up certain products that are available at the branch, it would be important to stop offering those products through that channel, and the minority of customers who are making use of the branch facility to take up those specific products will have to be educated about the digital platforms and routed there. This would reduce the overheads associated with operating branch facilities and ultimately benefit the customer from a cost saving point of view.

4.3.1.3.3. Customer Education

This sub theme focuses on the need to educate customers about the bank's digital platforms and the functionalities that are available on the platform.

Respondent 2 and 4, agree the bank should provide educational programmes to empower its customers about the digital offerings. Respondent 2 argues, often it is not a matter of customers being reluctant to use the digital channels and the functionality that the bank provides, it is however lack of knowledge that customers have.

4.3.1.4. Theme Four: Collaboration with 3rd Part Organisations

This theme focuses on the need to collaborate with 3rd party organisations, which are fintech companies to unlock value that an independent company would bring in terms of driving solution delivery to specific bank problems. Additionally, as a collaborative effort, the bank should form a consortium with the regulators to collaborate the development and coordinated design of new regulation that will enable the bank from benefiting from the solutions that they could develop as a result of the collaboration. Below are the sub-themes that emerged under this theme:

4.3.1.4.1. Collaboration with Fintech companies

Figure 22 below shows the percentage split of participants who believe the Bank should collaborate with fintech's or acquire the fintech vs building the solution-in house.

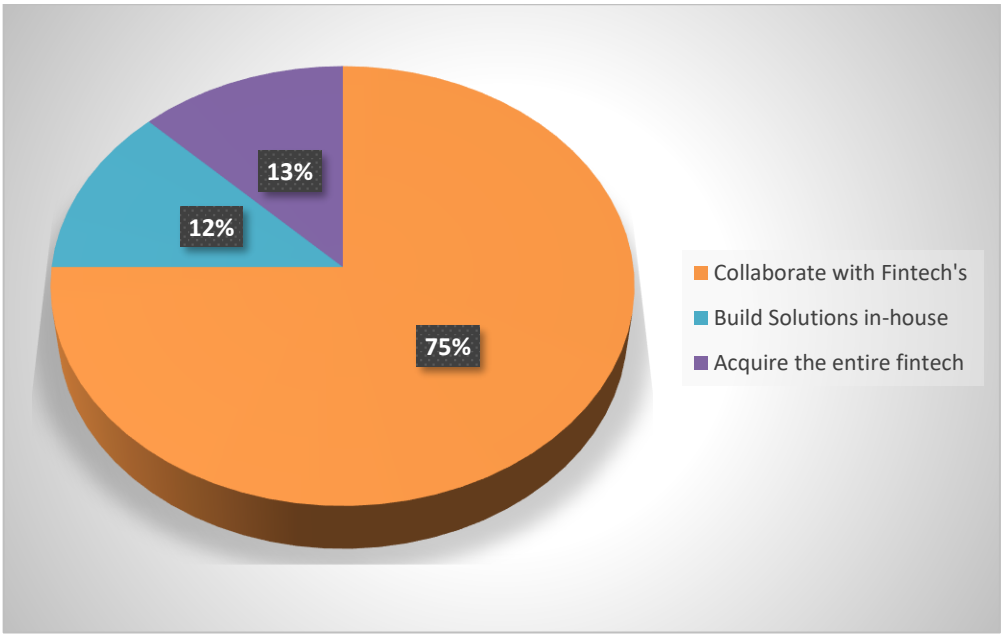

Figure 22: Collaborate with Fintech or build Solutions in house

Respondents 2, 3, 4, 6, 7 and 8 which is 75% of the participants agree there is scope to integrate with fintech companies in South Africa to drive solution delivery and leverage new opportunities that fintech's provide.

Respondent 6 puts emphasis on the need to collaborate with cell phone companies, the respondent says rather than competing with these cell phone companies who are creating payment systems like M-Pesa which makes it easier for the customer to live without a bank account because the mobile phone provides money transfer services, payments and micro-financing services. The bank would rather split itself into two components and say the bank may not want the customer interfacing with it directly because that is an expensive model in terms of setting up branch facilities and call centres. It would be best for the customer to interface with a cell phone company and the cell phone company interfaces with the bank for the banking component which is the infrastructure that enables the pillars of banking i.e. transact, insure, invest, and credit provisioning.

Respondent 5 indicates that bringing in fintech companies to drive solution delivery is not worth it, because they do not know how the current architecture and business processes work. The respondent further argues if the fintech is going to build a brand-new core banking application on a new architecture then maybe yes, there might be a scope to bring them into the bank's ecosystem, rather than developing solutions on the existing architecture.

Respondent 1 says the bank can explore the possibility of acquiring the whole fintech company to incorporate their solutions and human capital into the bank's operation. Although respondent 5 does not see the need to integrate with fintech companies at this stage, however the respondent argues that these fintech's exist because they want large traditional banks to buy them. The respondent states their primary interest is not to own a business, it is however to provide solutions to a specific segment of the market. Once they are established and have a customer base, they would then sell the business to traditional banks.

4.3.1.4.1. Engage with the regulators

This sub theme focuses on the need to collaborate and engage with the regulators. It is important for the bank to meet demands and continue to grow, therefore it is a need to develop a solid strategy for how the bank will manage various types of regulatory engagements and relationships.

Respondents 3, 4, 6 and 7 agree that from a regulatory point of view, the POPI act (Protection of Personal Information) which puts a limitation for the bank to only process relevant data with a specific purpose, additionally the act also states that personal information to be processed may only be collected directly from the data subject which is a limitation for the segment. Respondent 4 further argues that there is global regulatory restriction (GDPR) for customers who are United Kingdom(UK) or have any UK type of relation which is the same as the POPI act in terms of restricting the bank from processing personal information.

Respondent 2 states that regulators prevent the bank from hosting data outside South Africa, which is a disadvantage because most of the cloud storage providers are not in South Africa yet. As a result of this limitation the bank is at a disadvantage in terms of realizing the cost savings that come with using cloud storage providers.

4.3.1.5. Theme Five: Optimisation

This theme focusses on the importance of increasing organisational efficiencies by improving the current processes, methods, and its architecture, below are the sub-themes that were developed under the main theme.

4.3.1.5.1 Sub-Theme One: Focus Area

This sub-theme talks to the focus area on which the bank should be investing resources by evaluating which subsegment do digital banks pose the most threat within the commercial segment. The commercial segment, has two sub-segments which are

- Small Medium and Enterprise (SME), business with an annual turnover of 0-5 million Rands per annum
- Business Commercial customers (Platinum Business), business with an annual turnover of 5 – 60 million Rands per annum.

figure 23 shows the areas where in digital banks pose a threat, it highlights the focus area wherein special attention must be put however not forgetting the other sub-segments.

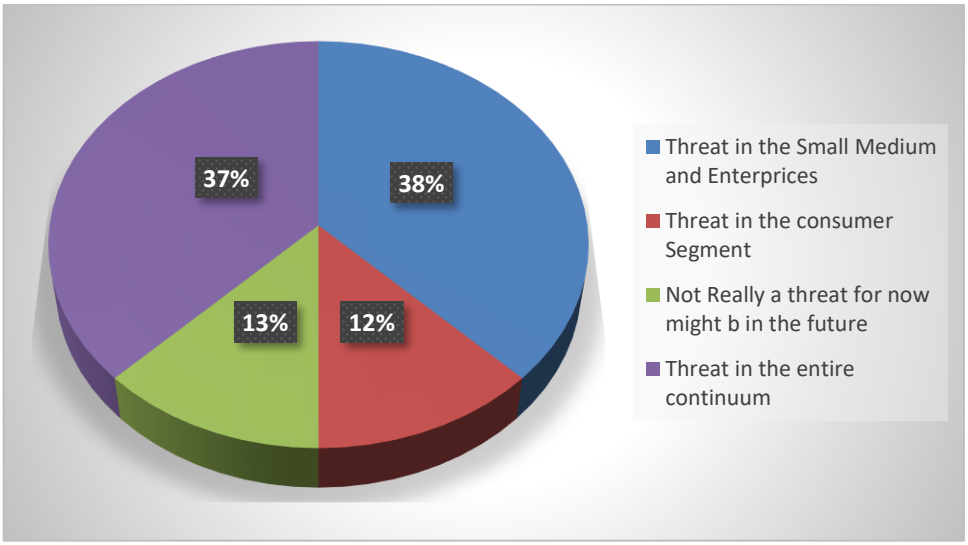

Figure 23: Threats posed by digital banks

The figure above indicates that 87% of the respondents agree that digital banks pose a threat to the bank's customer base. Of the 87% population who believe the digital banks pose a general threat to the bank, 38% of them believe the bigger threat is in the small medium and enterprises subsegment. Respondent 5 further argues that start-up companies which are part of the small and medium enterprises customer base have simple needs, they just need a cheap bank account so that can just receive and make payments out of it. They need a cheap bank account because they are not making any money and they cannot afford to incur any costs, additionally they don't need sophisticated set of products at that stage of their trading lifecycle.

37% of the respondents argue that digital banks pose a threat in the entire continuum of the bank's customer base, they further argue that in response to curbing the threat it is important to consider all

customer bases that make up the bank, i.e. Consumer, SME's, Business, Commercial and Corporate customers. 13% of the participants believe these digital banks are not a threat yet, with Respondent 7 arguing they don't have the value proposition and the financial backing to help the business in its journey to success, however the respondent says they will be a threat in the future. 12 % of the participants believe the bigger threat is in the consumer segment, because of the competitive pricing options that they have and the flexibility with which individuals have in terms of changing their bank account. The respondents further argue it is not easy for commercial customers to change the bank accounts like a normal consumer account would, while also saying it might be a threat in the future not currently.

4.3.1.5.2. Sub-Theme Two: Enhance the Data Architecture

This sub theme looks at rules, policies and standards which govern how meaningful data can be collected, arranged, integrated, and used in a data system.

Respondents 1,5, 6, and 8, state that the internal restriction the bank has is the data architecture. Respondent 1 further argues that the current architecture causes disparate data that is distinctly different in kind or character and it cannot be readily integrated to meet the business information demands. Respondent 1 says the bank needs more skills to enhance the data architecture to evolve to a more complex data analytics landscape. Respondent 5 and 6 say the bank has multiple databases for different systems that do not talk to each other, it is therefore important of the bank to get all its data into a single reservoir so that it becomes easier to start using it for analytics and coming up with models that build contextual solutions.

Respondent 6 says the bank should accelerate the implementation of a multi tenanted data warehouse which it is currently busy with. The idea of a multi tenanted data warehouse is that although there are different tenants that need different requirement to be accommodated, the data still meets the common standards and it can be accessed within the same warehouse. The respondent argues that an enhanced data architecture ensures common data standards across different systems is achieved. The respondent argues one of the challenges the bank is dealing with is different systems using different field names, e.g. one system database refers to a field as "customer name" while a different system may refer to it as a "client name". Enabling a single data reservoir would make all systems to conform to the standards of the reservoir which would ultimately make it easier to use from a data analytics point of view.

4.3.1.5.3. Sub Theme Three: Agile Project Processes

This sub-theme relates to the process to which the bank manages its solution delivery effort. Respondent 4 argues the bank manages the solutions delivery effort through a waterfall method, which is a linear sequential flow of the project deliverables, each phase depends on the deliverables of the previous phase, therefore the project cannot move forward until a phase of project is completed. This process is often slow, prone to higher error rates and does not adopt to the changing requirements. Figure 24 illustrates the phases of the project delivery effort through a waterfall method.

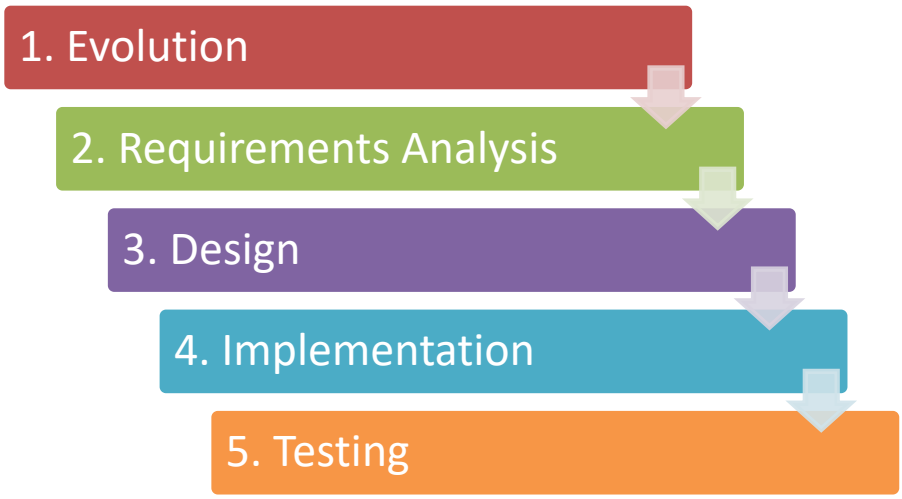

Figure 24: Waterfall Project delivery method (developed by the author)

To drive quicker solution delivery, respondent 4 says the bank should move from the waterfall project delivery method to an agile project delivery method, which would allow the bank to deploy software solutions quicker, so that customers can get value sooner rather than later. Respondent 4 further states that for the bank to be competitive it must capture the market before there's any competition.

4.3.1.5.4. Sub Theme Four: Key Drivers

This sub theme focuses on the reasons for optimisation, which is the operational costs, having to reducing workload and a general strategy of ensuring business customers are retained in a disrupted market.

Respondent 3,5, 6 and 7 say the bank has large operational costs which is associated with the large number of employees that have to deal with a lot of the manual processes, the bank tends to recover

that costs from its customers in a form of monthly account fees and service fees, so automating these manual processes will reduce the operational costs and allow the bank to offer cheaper products.

Respondent 1,4,5 and 8. Say the bank has to automate its customer decisioning process, credit decisioning processes where in that credit process requires the customer to send financial statements and those statements have to be manually captured into a system, the automation of capturing of that information will reduce the workload that the analysist have in terms of spreading financial statements and it will in turn allow for quicker turnaround in terms of the credit decisions.

4.3.2. Summary of results

The data collected and analysed above illustrates that the commercial segment should accelerate the adoption of industry 4.0 technologies to drive operational efficiencies and reduce operational costs. Data reveals that the bank should continue optimising the business processes by implementing agile project delivery methodologies to deliver valued solutions at a higher frequency, this would ensure products are brought to the market before competitors can even think about developing similar solutions.

Additionally, the segment should enhance its data architecture to ensure meaningful data is obtained. Collecting meaningful data would enable the bank to conduct data analysis in the quest to provide contextual solutions. Two new themes emerged from the analysis i.e., the implementation of a hybrid core banking application model (new core banking + legacy core banking application) which would enable the bank to adopt a progressive modernisation strategy which is using the best of both worlds until it can fully decommission the mainframe technology. Another theme that emerged is the collaboration with 3rd party organisations which are fintech's and regulators to drive and optimise solution delivery.

Figure 25 below shows a summary view of the themes that were developed in this study.

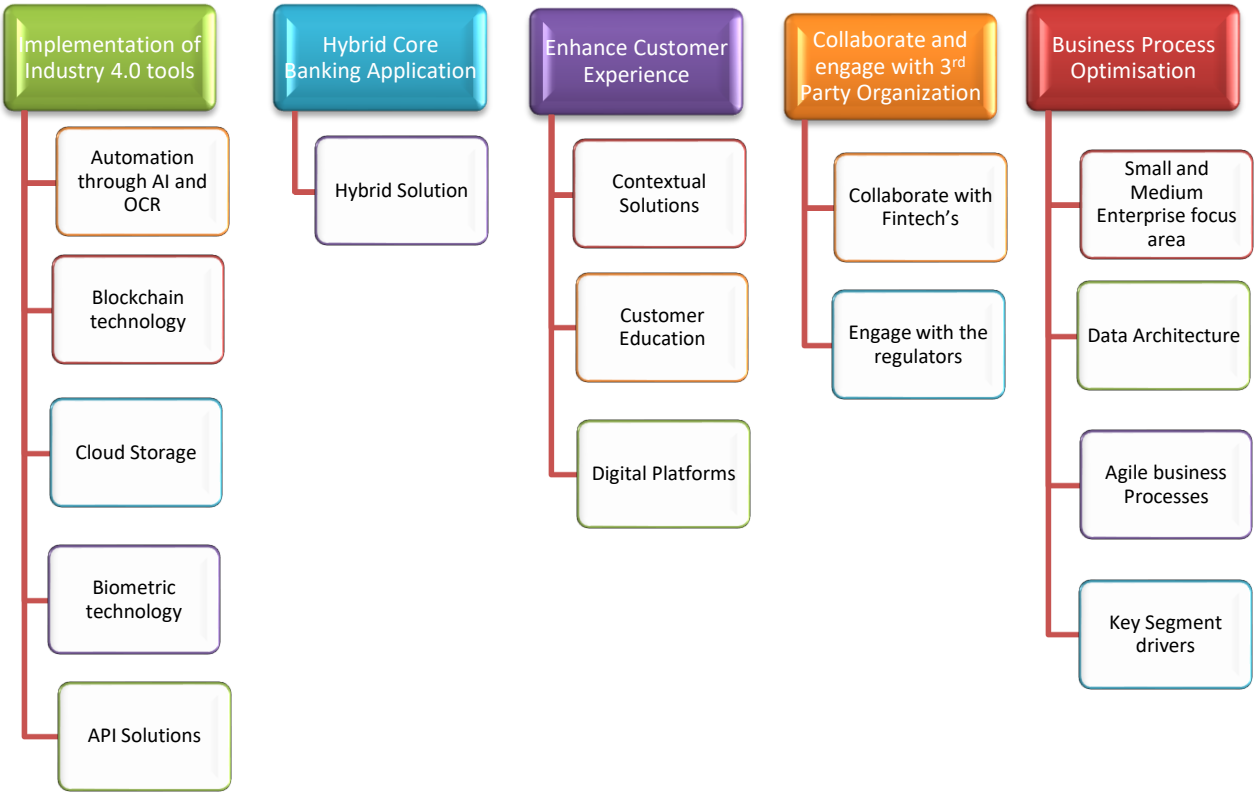

Figure 25: Developed Themes and Sub-Themes (Developed by the author)

Chapter 5

5. Discussion

5.1 Introductions

This chapter includes the discussion of findings derived from the previous chapter aligning it to the objectives of the study. The findings were then compared to the initial conceptual framework that was drawn in the literature.

5.1.1. Implementation of Industry 4.0 technologies

In response to the first objective of the study, which seeks to develop a conceptual framework on which industry 4.0 technologies and strategies should be implemented within the commercial segment of Bank A to respond to the threats that digital banks are posing. The study was conducted to seek the most relevant technologies which should be enabled.

The findings from the empirical data indicate that digital banks are a threat and have significantly changed the perspective of banking in South Africa. Many customers are migrating to these digital banks because; they provide a competitive pricing model, enhanced customer experience, provide contextual solution. As indicated in the literature by Business Tech (2017), Tyme bank has onboarded 18 000 business customers in less than two years of its operation. These customers cannot be attributed to the unbanked community only. There are business customers moving from traditional banks to these digital banks, particularly the Small and Medium Enterprises customer base who are looking to transact without paying account and transactional account fees. The respondents in this research agree that it is important to respond to this threat by implementing industry 4.0 technologies to maintain the competitive advantage by reducing operational costs and providing an enhanced customer experience.

The analysis done in section **4.3.1.1.1.** indicates that automation plays an important role in archiving higher productivity, reliability, increased performance and reduced operational costs. The data reveals that RPA technology is still at its infancy at the bank in the commercial segment. It is therefore important that the bank aggressively accelerates the implementation of RPA technology by automating algorithms for repetitive tasks particularly from a credit application perspective. Customers are generally required to send their financial statements in support of credit applications, automatically capturing these statements onto a system would enable quicker credit decision making and free up employees from manually capturing the financial statements to focus on value adding

projects. Comparing this to the literature drawn wherein Dabke (2018) says RPA is the eyes and the hands that uses the capability of data collection, artificial intelligence to interpret the collected data and automate repeated tasks and high-volume tasks such as processing credit card orders. Dabke (2018) further argued RPA technology has reduced operational costs and freed up the number of employees to focus on more innovative technologies.

We live in a technological age and hence, there is no institution that is immune to automation, the segment has started embracing some of the automation tools, however based on the responses received, it is evident that the bank still has manual processes that take up a lot of time and effort from staff as well as making them do routine activities on a daily basis leading to a loss of productivity and missing out on the opportunity to move up the value chain in terms of being competitive. The accelerated implementation of automation would benefit the segment from reduction in operational costs associated with having branch and call centre facilities, hiring staff members that would do these repetitive tasks. This cost saving can help the bank to develop a competitive pricing model, which can be used to ensure the current set of customers are happy and retained as well as attracting new commercial customers.

The result in section **4.3.1.1.2.** illustrates that the bank has no functionality that speaks to the implementation of blockchain technology because of the legacy architecture limitation. The data analysis show that it is important to implement blockchain technology to improve the current software infrastructure security and reduce the operational costs associated with facilitating cross boarder and cross currency payments. The bank currently facilitates the cross boarder and cross currency payments through a 3rd party bank which charges a lot of money, which also ultimately adds to the operational costs of the bank. This is comparable to the literature drawn wherein Kkozyra (2020) indicates that blockchain technology has affected the payments system, settlement system, it has changed the clearance and payment system and reduced operational costs and it has brought real-time clearance of finance between financial institutions. Fintech Weekly (2021) points out that blockchain technology brings in improved security that prevents hackers from accessing bank and customer personal information.

The adoption of blockchain technology would improve the experience of commercial customers who pay cross boarder suppliers and those that deal with currency payments as this technology would allow the beneficiaries to receive payments within hours instead of waiting for days like they do currently. Banks are required by the regulators to have an enhanced security that will enable the protection of customer information, as such the implementation of this technology would help the

segment to store information across a network of computers, which means compromising data becomes much more difficult for hackers. The high level of security afforded by blockchain technology makes it particularly appealing to customer as they know that their personal information is safe with the bank. This enables customer trust, which is an important facet of ensuring customer loyalty in your existing customer base.

From results in section **4.3.1.1.3.** wherein a respondent points out that the bank uses a physical data centre as a storage house. This has its limitation from a cost perspective because physical data centre providers charge for the storage size that is created for the bank, whereas cloud providers charge per storage utilisation. The data highlights the importance of migrating from a physical data centre to cloud storage providers. The bank, however, needs to be aware of the regulatory limitation preventing banks from storing data outside South Africa and look for cloud providers within the South African boarders. Data reveals the importance of engaging with the regulators for a more dynamic regulatory strategy to lessen the regulation around data storage allowing the banks to store data with cloud providers outside S.A. This is comparable to the data literature wherein Mister (2019) highlights the importance of cloud storage as it gives users the ability to share and access files without needing access to a physical data storage, reduces the costs associated with operating on a physical data centre. Cloud storage provides an additional layer of security to their service.

In the data analysis done in section **4.3.1.1.3.** the respondents agree that biometric technology plays an important role in terms of improving customer experience. The bank has an existing biometric technology that allows commercial customers to easily log on to the banking app using their fingerprint stamp or face recognition without the need to remember the username and password combination, which is often frustrating for customers particularly if they forget either one of the two. Data also revealed the importance of continuing to enhance the current capability and leveraging the capability of the technology in some of the business processes to improve turnaround times. When customers sign suretyship on behalf of other legal entities in support of a credit application, it is often a lengthy process because the bank would courier the documents to the customer to sign and return back before a loan payment can be made. As such, having customers approving suretyship though a fingerprint stamp would save a lot of time and allow quicker loan payment to be made.

Comparing the data to the literature drawn wherein according Entersekt (2019) argues that biometric technology is a tool that is used to enhance the customer experience in the digital channels, the literature indicates that banks have provided the simplicity of accessing the bank's digital platforms by allowing customers to log on to the app using their fingerprint stamp or their face recognition.

This enhances the customer experience because a customer does not need to remember the username and password combination when they log on to the digital platform.

The bank has an existing biometric functionality, which is used to enable customers to log onto the app. As per the data, it would be important for the bank to leverage the capability of the current technology to automate other business processes, particularly in the credit space. Small Medium and Enterprises applying for credit solutions often require quicker turnaround times as they need money instantly to solve for their cashflow issues, as such if the bank does not provide quicker turnaround times it runs a risk of losing a potential sale to other banks. The ability of a customer signing suretyship document using a fingerprint would reduce the turnaround times of associated with loan payments.

The results obtained in section **4.3.1.1.4.** indicate that the bank still uses business functions to integrate to other internal and external system. These business functions do not provide a great deal of flexibility, in that a small change can often require a great deal of impact assessment. The data revealed that it is important to move to the API solution to effectively share data and easily integrate with other systems. Comparing this to the literature wherein Mehdiabadi et al (2020) says API's provide a better way to share information, integrate with other systems, and provide personalised services, making financial services quick and efficient. API's can enable the bank to grant third party companies secured access to their banking platform to integrate and build solutions.

5.1.2. Evaluating the implementation of a hybrid core banking application

The new core banking platform allows the bank to define and deliver optimised, targeted, and dynamic value-added digital banking products and services to customers according to Next generation banking (2020). The literature indicates that migrating to the new core banking application unlocks the capability of keeping up with the rapidly evolving customer and market dynamics in the digital age, it provides interoperability in terms of the flexibility to seamlessly integrate with other third party systems and platforms using the dynamic API's. Interoperability is an important aspect of the bank as it determines the time it take to market a new product or service (Next generation banking 2020).

Comparing this to the analysis done in section **4.3.1.2**. a new theme emerged, in that respondents believe the bank should use a hybrid core banking model. This theme looks at a strategy to allow new core banking application to perform certain functions of the legacy core, until it can fully replace the mainframe technology. The hybrid model will combine the processing capability of providing

complex lending and transactional products that is already built on the mainframe technology and the ability to provide simple, cheap products on the new core banking application. This model will also break the limitation of interfacing the digital platforms to the core banking application that often leads to technical debt which is recovered through monthly account and service fees.

In terms of interfacing easily with the digital channels. The new sub-theme focuses on the need to use the best of both worlds for now until the bank can fully build the complex solutions that cater for complex customer needs on to the new core banking application.

The hybrid core model should be used to service two sets of customers, the new core banking application should be used to service the low profit customers which are Small Medium and Enterprises who have simple needs and almost expect to transact without paying account and transactional account fees. The second set of customers which are business commercial and medium corporate companies who have complex lending needs like debtor finance products and complex transitional needs should be serviced on the legacy core banking application in the interim. This strategy should happen to allow the segment to unbundle the complex solution on the mainframe technology and build it on the new core banking application. As the data reveals, the bank will not decommission the legacy core soon, it is therefore important for the bank to implement the hybrid model strategy to ensure customers are not lost and the commercial segment can continue to be competitive.

Threats of digital solutions on legacy core banking application

To address the second objective of the study which seeks to investigate the impact of enabling digital solutions on the current legacy architecture. An opportunity vs threat analysis of enabling digital solution on the current legacy core was explored.

According to the data analytics in section **4.3.1.2** the results reveal there are more threats more than opportunities of enabling and further enhancing the digital solutions on the current architecture. When the bank bought mainframe technology there was never a thought that one day it will interface with the digital channels, this presents a lack of seamless integration which then restricts the ability to do further enhancements on the current integration. As per the analysis the inflexibility often causes technical debt, which is a formidable barrier to sustaining competitiveness in the digital age. The respondents believe the bank's technical debt accrues daily as a result of software developers and the programme management office taking shortcuts and project trade-offs, wherein the focus

shifts from doing projects that add value because of the need to rework the code of existing interface between digital channels and the legacy core banking without changing the overall outcome.

The results drawn above are comparable to the literature where Jones (2019) argues that the mainframe technology is too old and normally goes through a plethora of changes and have catered for so many requirements over decades. Jones (2019) further argues this evolution normally presents banks with challenges in integrating to other systems particularly the digital platforms. Interfacing a digital channel to the mainframe technology would require a great deal of impact assessment, rigorous regression testing and post implementation code customisation to be done. Mainframe technology interfaces with many other internal systems, as such any code customisation on one integration component, often leads to issues to other components and these issues are generally not picked up until the software has gone live.

5.1.3. The value of enhancing customer experience

According to William (2018), the importance of enhancing customer experience adds to the revenue of the business, because a happy customer is more likely to be a loyal customer, additionally a happy customer is more likely to recommend products and services the bank offers, helping the business get more customers. The literature also indicates the importance of putting the customer at the epicentre of the bank's operation to ensure at all stages of the banks operations the customer needs are taken into consideration. When customer needs are natured throughout the bank's operation it ensures that customers are provided with contextual solutions that meet their evolving needs. Not only is meeting customer needs an important component of today's world, exceeding their expectation by using predictive analysis to capture their imagination of the future product offering plays a key role in ensuring customers are retained with the bank's customer base.

In comparison to the data that was drawn in section **4.3.1.3.** which also indicate the importance of building data models aimed at understanding customer needs throughout their lifecycle. The data also reveals the bank does not offer contextual solutions currently from a credit perspective, customers are offered credit solutions on their credit worthiness and not because of their needs. Often pre-scoring customers for credit solutions involves interface calls with the credit bureau to conduct credit record checks, the bank is charged per call they make. This adds to the operational costs of the segment particularly if customers end up not taking these products that they have been qualified for. Delivering the right solution to the right customer at the right time will drive business growth, because it will increase product take up, and those customers are likely to recommend the products and services to other people, this would add to the customer base.

Data in section **4.3.1.3.** reveals the importance of understanding patterns in large amounts of data to identify future trends in the banking sector and build models to forecast the invention of future products and service offering and to manage resources. The data also suggests the importance of the bank looking at customer experience through the mutual exchange lens, wherein the bank provides customers with contextual solutions on the banking platform and also the customers provide valuable insights in terms of their interaction with the banking platform which can be used as feedback to drive continuous improvements.

Data reveals that there are customers who still prefer to visit the branch or phone a call centre for their transactional needs. Visiting these platforms can often lead to customer frustration because of the long queues that they need to withstand for their needs to be taken care of. There are still functionalities that customers are not aware that it exits in the digital platforms, an example is a debit order reversal functionality that currently exists on the digital channels that some customers are not using to reverse any unauthorised debit orders. Digital channels have become the bases through which customers interact with their bank 24/7 and their needs can be taken care of. Data reveals the bank should have educational programmes to help customer who are not using the digital channels to alleviate customer frustration associated with queuing at the branch or at the call centre. Additionally, reaching out to customers with the educational programmes would help the bank connect and build trust, while helping the customer to use the platform.

5.1.4. The importance of collaborating with third party organisations

A new theme emerged in this study, which highlights the need to collaborate with fintech companies to drive solutions delivery for specific business problems. Engaging with the regulators to drive a dynamic regulatory framework to lessen some of the regulations around data processing and data storage with cloud providers.

As technological usage rapidly evolves in the banking industry, it has become important to find the right skills to develop solutions to business problems. It has however not been the case as banks struggle to find the talent in-house, hence a need to collaborate with fintech companies to provide technical solutions to specific business problems. Data reveals that the bank has to establish relationships with fintech's as a partner or a vendor instead of acquiring a stake in the company to incorporate already developed solutions and the workforce, the disadvantage as indicated by respondent 5 in section **4.3.1.4.** that fintech companies do not know the existing architecture and the problems associated with it, hence acquiring a fintech without consideration of the current state is

the same as buying technology and hoping it solves a specific problem. The partner and vendor model would be driven by the business units within the commercial segment. With this model a problem is identified right up front, and the relevant solution and technology would then be identified to solve for the problem that has been identified.

Data in section **4.3.1.4**. indicates the POPI act puts a restriction on the bank in terms of processing personal information for a specific purpose. The restriction limits the bank from processing and storing data to help with the analysis and building models which are supposed to be used to provide contextual solutions, which is a key principle of providing an enhanced customer experience. The data reveals that in order for the bank to benefit from the cost saving that cloud storage providers, the bank has to migrate its data from the physical storage that it is currently using to a cloud storage, however one of the limitations that the regulators have placed is prohibiting banks from storing data with cloud providers that are outside South Africa. This is a limitation because there are not a lot cloud providers in the country.

With all these restrictions it is important for the bank to engage with the regulators in a quest to achieving a more proactive regulatory framework that will lessen some of the restrictions that are currently limiting the segment.

5.1.5. Evaluating the importance of optimisation

Optimisation is a component of the bank's sector that helps it to boost their operational performance and set clear standards.

The commercial segment of Bank A has two sub-segments, the data highlighted the focus area wherein digital banks pose the most threat is the Small and medium Enterprise's space. The focus area ensures that the recommendations proposed are especially targeted at the right department. The data reveals in section **4.3.1.1.5** that Small &Medium customers prefer simple, cheap, and easy accessible products.

The data in section **4.3.1.5** reveals the importance of enhancing the data architecture to provide the key capability of collecting meaningful data by setting up standards for all the data systems across the bank. The data indicates that with the legacy architecture which contains multiple databases that do not interface with each other. This barrier has put a restriction on the segment in terms of harnessing the power of using data, which is a key in understanding customer, business, and operational needs. It is therefore important for the bank to develop a single database warehouse

across the bank that will force all the source systems to comply with the data standards. The single data warehouse will enable the bank to collect meaningful information that can be used to enable customer proposition.

Solution delivery method is an important component in the bank that enables the bank to deliver the right solutions for quicker marketing, ensuring successful transition to a new business or technical state to realise the benefits of the organisation. Choosing the right method allows the bank to realize these benefits. Data reveals the bank still uses a waterfall method to deliver its solutions, which is a limitation as it only allows the project teams to follow sequential steps that have to be followed one after until the previous phase has been completed. Any changes to the customer need will not be catered for and will have to wait for the next iteration of changes. The respondents indicate the bank has to move from the waterfall method into an agile methodology which allows quicker solution delivery ensuring the bank takes the product into the market quicker than its competitors, additionally value and customer needs will be met earlier which ensures an enhanced customer experience.

This is comparable to the literature drawn wherein Jones (2019) states that legacy banks, apply their solution delivery effort through an SDLC which has characteristics of a waterfall project methodology, which indicates that this method is a limitation in terms of agility for the bank to respond to customer needs at any point in the cycle due to the rigid nature of the process. The literature indicates that customers in the 21st century have high expectation that can change at any time therefore if these needs are not met the bank runs a risk of losing customers to these new digital banks.

5.2. Final Conceptual Framework

The results analysed and presented in Chapter 4 were interpreted and compared to the literature. Through discussion, the results agreed with the literature with a couple of new themes developed. A new conceptual framework is drawn below in figure 26 as per the results received in chapter 4:

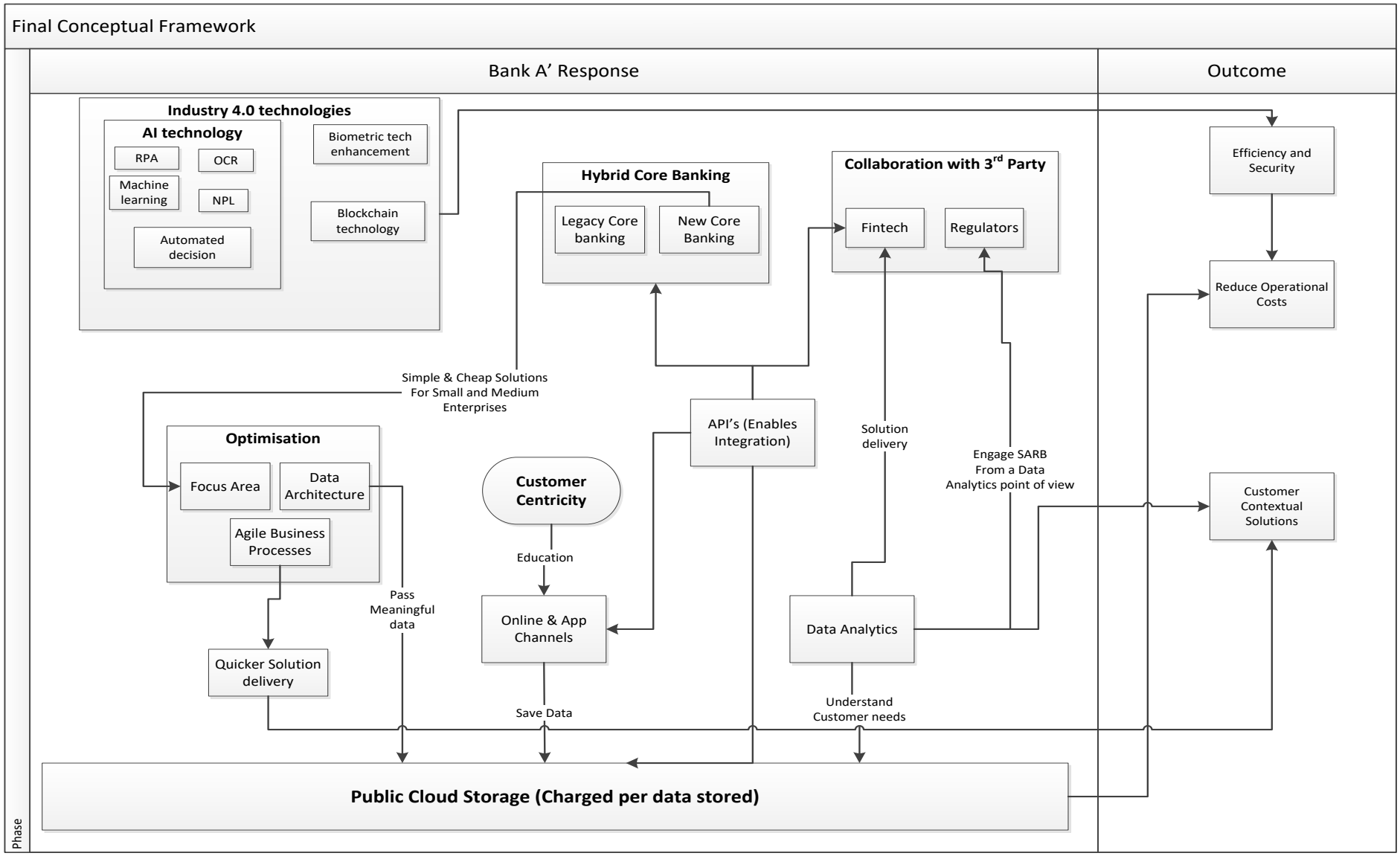

Figure 26: New Conceptual Framework

In response to the third objective which seeks to provide recommendation for the commercial segment to bridge the digital gap: deductions were made from the results and analysis:

- A suggestion for the bank to implement at progressive modernisation as a strategy to allow new core banking application to perform certain functions of the legacy core, while maintaining the good capabilities of the legacy core system, until the legacy system is decommissioned. The new core banking application can be used to interface with the digital channels to ensure that the required modern-day flexibility is achieved.

- Optimising the data architecture by ensuring data standards are maintained and the data is saved in a single reservoir. This will enable the bank to harness the power of data which can be used to build models which are essential to deliver personalised and contextual solutions that also build customer engagement and loyalty.

- Optimising the project delivery methodology by exploring a progressive and non-linear method which is an agile method. The agile method seeks to involve the customer throughout the project lifecycle by ensuring their needs are constantly taken into consideration. This method also enables quicker solution delivery before competitors reach the market.

- Collaborating with Fintech companies, instead of looking at Fintech companies as potential competitors, the bank can drive collaboration with them in terms of developing a partnership model, this would assist the segment to gain the agility and innovative approach of these fintech companies, while the segment also offers the advantage of an established customer base.

- Engaging with the regulators to ensure that a more dynamic regulatory approach is realized, particularly around the processing of personal information and the ability for the bank to store the data with cloud providers outside South Africa.

5.3. Chapter summary

From the discussion above it can be observed that monthly account and transactional account fees have become important elements that drive segment competition. Commercial customers have been introduced to the flexibility of having transactional accounts that do not require them to pay monthly fees. It is seen from the data analysis that commercial segment has large operational costs associated with operating and maintaining mainframe technology, having manual processes, operating branch

and call centre facilities, waterfall project delivery methodologies. The costs has to be recovered through the customers transactional account and any other products they offer. In response the commercial segment must cut the operational costs by implementing the right industry 4.0 technologies as indicated by the data analytics, enabling the core banking application that will benefit customers and optimising the business processes. These implementations will enable the segment to shave off the monthly account fees and still provide the same value proposition that customers have. As such, the success of the commercial segment competing with digital banks will therefore be measured by the number of customers retained and new customers attracted because of the reduced monthly fees and the value they value proposition they have.

Another important element that drives segment competition is the ability to enhance the customer experience by providing contextual solutions to meet and exceed customer needs, enabling easy to use digital channels, providing educational programmes to build customer trust and loyalty. Enhancing customer experience will also contribute to commercial segment competing with digital banks.

Chapter 6

6. Conclusions and Recommendations

This chapter gives an overview of the answers for the research questions and summary of the findings, it provides future recommendation both for the study and the commercial segment of Bank A.

6.1. General conclusions

This research provides beneficial information in terms of how the commercial segment of a traditional Bank A should respond to new digital banks to remain competitive.

According to Daly (2020), the most important features that customers want from a bank are paying minimal account management fees, high quality customer service, fraud protection and access to the digital channels. The study conducted shows that digital banks have disrupted the financial services market, customers are migrating from incumbent traditional banks to digital banks. The migration is because of the low competitive pricing model, the value proposition, cheap and simple solutions which is enabled by their industry 4.0 technological adoption. Additionally, the new core banking application which interfaces easily with the digital platforms, optimised business processes which allows them to develop solutions and market them before competitors reach the market and the overall improved customer experience. All of this is evident with how Tyme bank one of the digital banks in South Africa was able to gain approximately one million customers in its eight months of operation (BUSINESSTECH 2019).

This research was used to determine how a traditional bank A in the commercial segment can respond to the challenges posed by the establishment of these new entrants. This was achieved by exploring three objectives which are outlined in the first chapter of this research.

A qualitative approach was used to explore the subjective opinions of eight experienced subject matter experts in the commercial segment to draw raw data which was then analysed using an excel spreadsheet to develop recuring sub-themes and themes. These sub-themes and sub-themes were then used to draw a final conceptual framework which the bank should explore.

The current findings suggest that the digital banks pose a threat to traditional banks in South Africa particularly in the small medium enterprise's customer base. A such, it is important for the bank to focus on these key areas; adopting industry 4.0 technologies outlined in chapter four, a new theme that emerged which is the implementation of a hybrid core banking application (New Core Banking + Legacy Core System) to service two sets of customers. Another new theme that emerged is the collaboration with fintech companies to drive contextual solutions delivery and to constantly engage with the regulators for a more dynamic regulatory framework that will allow the bank to process personal information for data analysis purposes. Lastly optimise the business by improving the data architecture to obtain meaningful data and to enhance the project delivery methodologies.

Comparison of the results to the theory was done in chapter 5 and the initial conceptual framework is similar to the final conceptual framework with the addition of new themes that emerged in the final conceptual framework. The framework was used to answer the critical research question.

6.2. Recommendations

6.2.1. Recommendation for future studies

In this research study the sample population was limited to the commercial segment, to improve generalizability it would be beneficial to extend the research to other segments of Bank A particularly the retail segment, where according to the data it was proven that digital banks do pose a threat to the retail segment. This would provide future researchers with the ability to gain further understanding of how the bank in its entirety should respond to the threats that these new entrants pose on incumbents. Additionally, future researchers can expand the scope of the project by including fintech companies in assessing the threats that they pose to incumbent traditional banks.

The Sample size selected for this research was eight participants, which is relatively smaller. A bigger sample size would have enhanced the generalizability, which would have improved the reliability of the research study.

A secondary method of collecting data like a survey would be beneficial in the future, particularly for participants who may be reluctant to speak against their organization or some of the current business process, systems.

6.2.2. Recommendation for the Commercial Segment

Competitive pricing model and providing contextual solutions to customer plays an important role in customers deciding to settle with a bank. The bank is already on a digital transformation strategy with the intention to implement a platform which is unbundling what the bank does currently to develop a product engine place where the balance sheet sits, where lending happens from, where deposits are taken, however there is still a need to aggressively drive the improvement of the core business, improve technology, bring more people online, drive down the cost needed to serve customers while at the same time investing resources in terms of the data architecture to understand and solve for contextual customer needs, continue to aggressively develop and implement intelligent services.

To gain a holistic view of the threats of losing customers, the bank should conduct rigorous analysis to find out how many customers have an existing bank account with the bank, however there is no transactional activity on the account and whether those customers are either using digital banks or fintech's to manage their financial world.

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Appendix A

Letter of Consent

Dear Participant,

Thank you for accepting to participate in this study. Please complete this consent form as you see appropriate. By signing this consent form, you are indicating that you have read and understood the description of this study and that you agree to the terms as described below:

	Mark with X	
	YES	NO
I confirm that I have read and understood the information about this study as provided in the participant's information sheet.		
I understand that my participation is voluntary and that I am free to withdraw at any time without any penalties or negative consequences against me.		
I grant permission for the interview to be audio recorded.		
I agree that the information I provide may be treated as strictly confidential and anonymous and only the research team will have access to the interview data.		
I understand that the information acquired from the interview will not be recorded in excess of what is required for this study.		
I agree that the results of this study may be recorded in academic journals and at conferences.		
I have had the opportunity to ask any questions related to this study and I have had all my questions answered to my satisfaction.		
I may request a report summary, which will come as a result of this study.		

With full knowledge of all above-mentioned terms, I agree to participate in this study.

Participant		Consent taken by (Researcher)	
Name		Name	
Signature		Signature	
Date		Date	

Appendix B

Information sheet information sheet

Date 29 September 2020

Dear Participant,

Re: Participation in Research on "Bank A's commercial segments competitiveness in a market disrupted by Digital Banks in South Africa

Thank you for agreeing to participate in an interview that will help the research on How Bank A's commercial segment can remain competitive in a market disrupted by Digital Banks in South Africa.

I am a part-time MSc student in the School of Mechanical, Industrial and Aeronautical Engineering at the University of the Witwatersrand, under the supervision of Dr Bernadette Sunjka. My MSc title is: Bank A's commercial segments competitiveness in a market disrupted by Digital Banks in South Africa.

My belief is that the 4th industrial revolution is upon us as a country and thanks to the introduction of 5G networks, information flows has allowed for a collaborative way of doing business. The new technologies have changed the current business models, paved a way for faster innovation, also created new opportunities for revenue growth and also increased customer expectations on all the product/service that the banking sector offers. Emerging digital banks have fully embraced the technological advancement brought about by industry 4.0 and therefore pose a threat to incumbent traditional banks in terms of getting access to their customer base and ultimately their revenue. I would specifically like to understand the role that the Bank A's commercial segment will play to bride the digital gab introduced by digital banks to ensure that the Banks remains profitable.

I would like to formally invite you to participate in this study. As a Subject Matter Expert (SME) in the segment of the well-established Bank in South Africa, your knowledge and experience would contribute significantly.

The study will be conducted between October and December 2020. Involvement in the study would entail a face to face or a virtual interview, as the SME, at your convenience. During this interview I would like to understand how the commercial segment can bridge the digital gab introduced by Industry 4.0 to remain competitive in a market disrupted by digital banks.

Participation in the study is voluntary, and you may withdraw at any time. Anonymity (regarding company name and any owner/manager/employee names) and confidentiality of information provided will be assured and respected. I would like to record the interviews, so I can later transcribe them. Your consent at the time of the interview will be requested. If you do not wish the interviews to be recorded this will be respected.

The results of the study will form part of my MSc dissertation report and may also be reported in academic papers and at conferences. A summary of the results of the research will be made available to you on request.

Please contact me if you have any questions regarding the research and participation in the study.

I look forward to hearing from you.

Yours faithfully

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Appendix C:

Interview Questions

Interview Questions

Project Background & Context

- Industry 4.0 in Banking

Critical Research Question

- How can Bank A's Commercial Segment bridge the digital divide brought by Digital banks, to ensure they remain competitive

Theory concepts to derive Interview questions.

Industry 4.0 – Impact
Interview Questions
1.How would you define the impact of industry 4.0 in the Banking sector in South Africa?
2.Describe the customer expectation within the South African banking market in this digital era.
3. What other factors slow the uptake of technology - does unemployment do?
4. Do digital banks pose a threat to incumbent traditional banks in South Africa 4.1 What can be done to curb that threat

New Core Banking Application
Interview Questions
5. Does the legacy core technology and architecture restrict the commercial segment from creating from realizing its goal 5.1 What can the bank do to remain competitive in this regard offer a personalized customer experience
6. Describe whether there more opportunities or threats of enabling digital solution on the legacy architecture
7. What should the bank do with its legacy core banking application, should it keep it or decommission it

Big Data Analytics
Interview Questions
8. Describe how the bank can use data to develop contextual solutions
9. Are there any restrictions that prevent the bank from using data effectively

Industry 4.0 Technologies
Interview Questions
10. What Strategy or industry 4.0 technologies can the bank put in place to drive operational efficiency

11. What can we do to bank the unbanked community like street vendors that Tyme bank is largely targeting

12 Is there scope to collaborate with third party organisations to drive solutions delivery
13.What are other mechanisms can the bank put forward to improve customer experience in ensuring that existing customers are preserved. (is there scope to implement Biometric Technology

Appendix D

Raw Data

Participant 1

Demographic Information

Participant	**Participant 1**
Current Role	**Head of Operations**
Years of Experience	**10**
Area	**Lending Fulfilment**

Project Background & Context

- Industry 4.0 in Banking

Critical Research Question

- How can Bank A's Commercial Segment bridge the digital divide brought by Digital banks, to ensure they remain competitive

Theory concepts to derive Interview questions.

Industry 4.0 in Banking – Digitization	
Interview Questions	**Responses and field notes**
1. How would you define the impact of industry 4.0 in the Banking sector in South Africa?	Well, think that as banks we haven't taken full advantage of this 4th industrial revolution and the reason I say that is because we have taken so long to invest in the right technology we still run so many of our banking system on legacy technology that do not support some of the benefits that the 4th industrial revolution brings, that's why we face the pressure from Fintech's, there is a big race in our own bank to try and catch up with what would be looked at in the rest of the world as basic functionality, including online contracting, OCR technology for our documents, that's all very old technology that is still new in the south African context, simply because we have taken to long to improve our systems. there is now a race for everybody to improve those systems and get them up to speed to use some of this functionality. So not to say that they hasn't been a benefit, i think particularly our modelling space in FNB we can say that our models are and there is some good AI in our models from a risk perspective, but again you know if we had the right infrastructure like even considering a small quantum computer for our Bank A, we could easily take that up to machine learning and deep learning of which we can't do given our current architecture. So i think our advancement now are very basic and there is definitely room to go
2. Describe the customer expectation within the	So, when you speak about Tyme bank and we speak about discovery, there is two separate elements. I think Tyme bank is targeting a market that in a way that is not traditional and

South African banking market in this digital era.	better suites that market, like for example for Tyme bank you see these stations in the supermarkets where a customer can just walk up even if they just feel like it, they can just go up to it and open an account just to try it out. I think that experience of opening a free account and for it to not have an impact to their financials, those are the things that resonate with that sector of the market. i mean even our zero account items it's still a pay as you go account and what these other banks like a Bank Zero or a Tyme bank are offering or what they starting to offer that segment of the market zero fees account, they are trying to run their systems and their business models on an interchange generated from those accounts rather than say we going to collect fees from customers. with regards to FNB we have a very large operational cost in order to run FNB, we've got large amount of employees, there is a lot of manual processing in our space and we have to recover that cost somewhere and we tend to recover that from our customers, So that already and our architecture makes us very or we can't be as competitive as we would like to be, so i don't think it's so much about being slow, i think it's just sometimes it's just the basic needs of customers and i think we offer a lot more functionality for our customers that these other banks do, but the question is do customers even need that extra functionality. And again, different sectors of the market in fact if you do a customer needs analysis across customers across all our sectors you going to see that each customer is unique, and each customer has different needs. You might have a very highly paid individual in FNB as an FNB customer and just needs an account to run debit orders, but we offer all this extra functionality that the person doesn't need and at the end of the day they end up paying for it and that's definitely part of the reason, and Discovery coming in with the view of understanding a person at an individual level that seems to be more what their sell is, we segment our customers into Gold, Premium, wealth etc and you stay in that bucket based on your turnover that's not a customer needs analysis, so i think customers are changing in this digital age and they are becoming a lot more fussy about what they want that's personalized. i think if they can personalize other experiences in their lives digitally i think that choosing between a massaging platform and social platforms why can't they choose between the functionalities that they want from their bank and not have to pay for it. So i think we just dealing with a different set of customers now rather than saying that it's just because we so big and we slower than other banks, there is a lot of other factors to consider that customers are trending towards these smaller banks that don't have large traditional legacy operational cost behind them.

3. What other factors slow the uptake of technology - does unemployment do?	So look, I think what we have had is people doing jobs that a machine can do for a very long time, so definitely tech is taking away work but it should be putting people in the position to do work that a computer cannot do, let's talk about the spreading of financial statements. That spreading of financials if you bring OCR technology in, it's actually not the same. you have a set of accounting financials reporting standards but if you look at the way one customer writes their management account next to another customer, naming conversion that is not easy, then you throw language into it ,i mean our Free State, Northern Cape customers they all Afrikaans, so their financials are done in Afrikaans, so you throw language complexities to it, let's talk about a mix of languages you got English and Afrikaans group that you trying to spread these financials it's difficult. what OCR technology is going to do is to attempt to spread it and probably going to throw out exceptions and someone will still have to quality check it and also if a computer can't do it then a person steps in to do it, so what it's doing is taking out the bulk of the work so that people can apply their knowledge and skillset in a way that they should rather than doing run of the mill work. We have a similar model in the bank, it's out high risk model, which is "manila" fist AI model, it does an AI analysis on the customer's account and it generates this report of the customer in under 8 minute, what used to take analyst days to do, this model is now doing in 8minutes, what it does is it spits out the report and the analyst can go and see what is written there and can analyse the output rather than putting it together and causing quality issues in that compilation and taking wrong decisions on a customer, so i don't think it's necessarily taking jobs but its changing the way people work. There is definitely an element of people being redundant, i have staff in my space that left school and never did anything further in their lives, those people are definitely a concern for us, we are embarking on a big learning journey within FirstRand, i know my areas is piloting a repurposing framework for employees so that we can repurpose them into other roles, but that has it's obvious limitations, for an individual that's come straight out of school how do they do future work jobs such as process analysis, project management, they can do elements of sales and serve but with customer needs becoming complex can an individual dot that, so we obviously going to try skill these people and that is definitely a consideration at the management level that it is likely going to take jobs in way but it is also going to be incumbent on that individual to say the world is changing and i need to make myself relevant. back in the days people used to manually put on the street light, somebody used to go around with the candle lighting in street lights, somebody's job got taken away the moment electricity came in and that just the sort of cognisant of, you have to re-invent

	yourself, individuals will have to take ownership of that and reinvent themselves and as an organization as a corporate we have to be able to support it. but individuals need to take up the opportunities.
4. Do digital banks pose a threat to incumbent traditional banks in South Africa What can be done to curb that threat	I definitely think that they cause a threat on our SME (Small medium enterprise) space, again it's because they have in those spaces they are start-up companies and they have very simple needs, and a lot of the time they need just a bank account to get started or to start receiving payments. i think where these digital banks are going to fall down is that that portion of the life cycle of a business customer is very short, at the beginning they need just a banks to start receiving payments and after that they actually need some advice, they need some help to get along. So whether it's a digital banks or a legacy bank what they need to do is tackle that portion in a smart way, they need to be able to do models to understand the personalised needs of that business customer, because the lifecycle of a customer differs from one another, your lifecycle and my lifecycle is very different because we have made different choices in life, so the same thing happens on a business customer, it's not just the sectors that they are in, these are people running these companies and some of them make bad decisions and some of them make really good decisions and that can put them in different portion of thier lifecyle at different stages. So you need smart modeling in order to understand what is the customers need and where are they at the point in thier lifecyle and what we should be offering them. The Commercial banks that is going to win this market is the bank that gets that portion right and i don't any bank has gotten that right particularly. we have made initiatives to help our customers to teach them like FUNDABA, but again it goes down to understanding your customer and understanding your economy, how educated are these individuals, do they have access to data, should we be looking at giving free data to our customers. Our data in South Africa remains on of the most expensive, which is a basic need that individuals can't afford, our data is so much more expensive more than other countries around the world, you have countries like India which have over 250 banks, and they can succeed in a market becuase thier data costs are so low, which then becomes easier to engage with an individual, so i think that as long as we not personalising our experiences with customers and customizing the experiences of a business customer and their lifecycle, doing something as simple as being multi lingual because a language in a corporate company might be English but it is not the language of our customers, it's not their home language and it's probably not the language that they do business with their customers with, and setting up that customer up for failure as long as you don't converse them in their language, it might be something

	as simple as that that you might be able to help them on their journey to grow their business if you could just speak the same language, so having chatbots that can chat to you in any language for me i have always felt it is critical especially in a country like ours where we have 11 official languages or 12, but a lot of our chatbots, documents and OCR is still very much English. So not to say that they hasn't been a benefit, i think particularly our modelling space at the bank we can say that our models are and there is some good AI in our models from a risk perspective, but again you know if we had the right infrastructure like even considering a small quantum computer for our Bank A, we could easily take that up to machine learning and deep learning of which we can't do given our current architecture

New Core Banking Application	
Interview Questions	**Responses and field notes**
5. Does the legacy core technology and architecture restrict the commercial segment from creating from realizing it’s goal 5.1 What can the bank do to remain competitive in this regard	So look, I think our legacy core is a restriction in a sense that it's just an account, it's literally just an account there is nothing else that we offering our customers. So, what we are trying to do is to offer the customers a more fluid experience on the same product, we not really creating any new products. we have introduced a virtual card 'ok cool it's still a card' when we start to look at things like "Alipay" where you can pay with your face wouldn't it be such a really cool thing for our economy where you have a largely illiterate economy that would find it easier to pay with their face instead of trying to enter digits into a card. So, Mainframe Technology does have restrictions but i think it’s not restrictions in a sense that it stops us from selling our basic products, it stops us from creating new products. it's very much if you think about blackberry's or Nokia's and how they just continue to push forward with the same innovation as opposed to re-engineering themselves like iPhone and completely take off the market, that's what we continuing to do, that's why Fintech's have are becoming strong competitors because they just continue to re-imagine the customers need and experience. To date we do not have any functionality that talks to how we deal with blockchain technology and the safety it provides and that's because our core technology is too old. the world is moving on and our core technology is a restriction and we stay in the ambit of what it can deliver and we put pretty packaging on top of it like app functionality and Online banking functionality, but at the end of the day for as long as Mainframe Technology remains our core we going to be restricted in terms of the sort of product development and sort of products we can offer our customers.

	I think we will eventually end up with two cores eventually Lebo, you going to always have customers that need these types of accounts, unless in the phase of a complete overhaul of the concept of banking like the difference between a blackberry and an iPhone, you kind of stuck with this core, in the absence of it being able to support any new types of technology we probably have to have a second core that talks to that, but we will still going to have a large base of customers that only want what Mainframe Technology is offering today and that is sufficient for customers and that's why you need to go back to the needs analysis, how quickly is your market changing and what are customer's needs. are your younger generations expecting more than just a bank account and what do they want in order to transact, what is transact in their worlds anymore, is money the form of transaction anymore. those are sort of the questions you need to ask yourself and turn the world on it's head, ask these new 'Genzedas' what do you all want, because out architecture needs to talk to what they want going forward, and at the moment i can't see how Mainframe Technology needs match that. in fact all of the things that we doing now and spending money on now is going to be a non-event
6. Describe whether there more opportunities or threats of enabling digital solution on the legacy architecture	So Mainframe Technology does have restrictions but i think it's not restrictions in a sense that it stops us from selling our basic products, it stops us from creating new products. it's very much if you think about blackberry's or Nokia's and how they just continue to push forward with the same innovation as opposed to re-engineering themselves like iPhone and completely take off the market, that's what we continuing to do, that's why Fintech's have are becoming strong competitors because they just continue to re-imagine the customers need and experience. So i think you you will end up with two core solutions eventually, you always going to always have customers who just need these types of accounts. unless you are in the complete face of overhaul of the concept of banking like the difference between blackberry and an i-phone, you kind of stuck with this core and in the absence of it not being able to support new technology we probably going to have the second core that supports that. you still going to have a large number of customers that would want what your legacy architecture can deliver and that's sufficient for customers and you have to go back to this needs analysis, how quickly is your market changing and what are customers needs. are your younger generation expecting something different other than a normal bank account and what do they want in order to transact and what is transact in their world anymore is money the form of transaction anymore. Those are sort of questions that you need to ask yourself and turn the world on it's head and ask these new Genzetas what do you all want, because our architecture needs to talk to what they want going forward and at the moments i can't see our legacy technology needs meeting

	that. a lot of the things we are doing now and spending a lot of money now is going to be a non-event to the likes of them in the future
7. What should the bank do with it's legacy core banking application, should it keep it or decommission it	I think we will eventually end up with two cores eventually Lebo, you going to always have customers that need these types of accounts, unless you are in the phase of a complete overhaul of the concept of banking like the difference between a blackberry and an iPhone, you kind of stuck with this core, in the absence of it being able to support any new types of technology we probably have to have a second core that talks to that, but we will still going to have a large base of customers that only want what Mainframe Technology is offering today and that is sufficient for customers and that's why you need to go back to the needs analysis, how quickly is your market changing and what are customer's needs. are your younger generations expecting more than just a bank account and what do they want in order to transact, what is transact in thier worlds anymore, is money the form of transaction anymore. those are sort of the questions you need to ask yourself and turn the world on it's head, ask these new 'Genzedas' what do you all want, because out architecture needs to talk to what they want going forward, and at the moment i can't see how legacy core needs match that. infact all of the things that we doing now and spending money on now is going to be a non-event

Big Data Analytics	
Interview Questions	**Responses and field notes**
8. Describe how the bank can use data to develop contextual solutions	Yeah look we definitely have restrictions, we might have data but we have very disparate data that's not talking to one another in the bank, so I know there is a big drive to get the architecture right to get that data, the next thing is we might collect the data but the data is too old "T+1" is too old, you need to be able to make Realtime decision on your customers to actually have your core data only available on t+1 and then you run your models on t+1 data, by t+2 you getting results, you know by t+2 it's too old, your customers life has changed dramatically in 2 days. So having the data and having the architecture to use it effectively are two very different things, i think there is a very big journey that we need to go on, i spoke a little bit earlier about quantum computing, you need that sort of processing power behind it in order to actually get to what the customers wants at the right time and when they need it. and again there is some models that we can get right in terms of using trend analysis models and if you can see a customer trend and behaviour. and i mean we do have those models, i know there was one model in the bank that talked to customer contactability ,which spoke to what time is the right time to contact a customer, because a customer is running a business during the day, they might not be accepting calls at night

	because they might be a family person, there is some really cool models that we have in the bank but we do have the experience to create the right models however we are lacking the architecture and definitely we do need more of those skills in the bank in order to really evolve, a lot of our skills are focused on BI and MI data analysis and we have to move and progress towards more senior data scientist in order to really take hold of this. i believe There is a journey in the bank or the group as a whole with regards to creating the right data teams and to support any new architectural development work with regards to data moving forward. So it's not a case of so much of having the data but can we use it when we need to.
9. Are there any restrictions that prevent the bank from using data effectively	Yeah look we definitely have restrictions, we might have data but we have very disparate data that's not talking to one another in the bank, so I know there is a big drive to get the architecture right to get that data, the next thing is we might collect the data but the data is too old "T+1" is too old, you need to be able to make Realtime decision on your customers to actually have your core data only available on t+1 and then you run your models on t+1 data, by t+2 you getting results, you know by t+2 it's too old, your customers life has changed dramatically in 2 days. , there is some really cool models that we have in the bank but we do have the experience to create the right models however we are lacking the architecture and definitely we do need more of those skills in the bank in order to really evolve, a lot of our skills are focused on BI and MI data analysis and we have to move and progress towards more senior data scientist in order to really take hold of this. i believe There is a journey in the bank or the group as a whole with regards to creating the right data teams and to support any new architectural development work with regards to data moving forward. So it's not a case of so much of having the data but can we use it when we need to

Industry 4.0 technologies	
Interview Questions	**Responses and field notes**
10. What Strategy or industry 4.0 technologies can the bank put in place to drive operational efficiency	i think particularly our modelling space in FNB we can say that our models are and there is some good AI in our models from a risk perspective, but again you know if we had the right infrastructure like even considering a small quantum computer for our Bank, we could easily take that up to machine learning and deep learning of which we can't do given our current architecture. We have a model in the bank, it's out high risk model, which is "manilar" fist AI model, it does an AI analysis on the customers account and it generates this report of the customer in under 8 minute, what used to take analyst days to do, this model is now doing in 8minutes, what it does is it spits out the report and the analyst can go and see what is written there and can analyse the output rather

	than putting it together and causing quality issues in that compilation and taking wrong decisions on a customer. To date we do not have any functionality that talks to how we deal with blockchain technology and the safety it provides and that's because our core technology is too old. the world is moving on and our core technology is a restriction and we stay in the ambit of what it can deliver and we put pretty packaging on top of it like app functionality and Online banking functionality, but at the end of the day for as long as Mainframe Technology remains our core we going to be restricted in terms of the sort of product development and sort of products we can offer our customers.
11. What can we do to bank the unbanked community like street vendors that Tyme bank is largely targeting	so you know, you can't say we not targeting them, because Capitec has made a lot of money out of them. It's a concept called financial inclusion. I had the opportunity to work with the fnb india office and they set out to bank the slum of "Deravi", deravi is a slum that is 1Km by 1Km by area right, and they set up to bank there because that area turns over a billion dollars a day in its economy in that 1km by 1km area, it's a slum, but the sort of work that goes on in that slum, your Levi are coming out of there, your Gucci's are coming out of there, your Louis Vitton from the leather making factories they all come out of that slum, so there are these hidden sectors that sit and in FNB commercial we call it the unseen economy, we actually have individuals that run what we call sector of commercial called the unseen economy that's looking to financially include these individuals. if someone is breaking mangoes and is selling it at the corner of the street or selling chips at the corner of the street that person is in need for some sort of a banking facility, maybe not a traditional account, but it might be a wallet system, what other options are rather than taking this money that they collect and putting it under their matrass. At the end of the day these are people who are earning money, these are people that need to have savings and financial goals in life. they need to grow themselves financially or else they will forever stay lost in that unseen economy; they will forever have this income disparity for as long as we don't proceed on a financial inclusion journey as banks. we need to consider social development goals, if you talk about social development goals, poverty and is something that we want to eradicate as world leaders, it's something that sists there and what do we as banks do in order to play our part in that, i really think that we have to again how do we help people and in helping people make money as opposed to making money of people, it's a change that needs to happen we can't say that these people don't need, how do we help these people to rise up from where they are and make money in the process

	so i think that as long as we not personalising our experiences with customers and customizing the experiences of a business customer and their lifecycle, doing something as simple as being multi lingual because a language in a corporate company might be English but it is not the language of our customers, it's not their home language and it's probably not the language that they do business with their customers with, and setting up that customer up for failure as long as you don't converse them in their language, it might be something as simple as that that you might be able to help them on their journey to grow their business if you could just speak the same language, so having chatbots that can chat to you in any language for me i have always felt it is critical especially in a country like ours where we have 11 official languages or 12, but a lot of our chatbots, documents and OCR is still very much English.

Interview Questions	Responses and field notes
12. Is there scope to collaborate with third party organisations to drive solutions delivery	There is definitely a need and this is where my opinion on us traditional companies go wrong, we so scared of sharing of knowledge, losing of competitive advantage that we end up building these large workforces and inadequate skill set in order to try and get to what these FinTech's are offering, if you look at data, modelling, OCR technology as an example, do we really have to build that inhouse, we know so many companies and banks around the world and companies that are not in banking and have got this right, why is it so impossible to go externally to buy this stuff and do minimal customisation in order to cater for ourselves rather than building this inhouse, it becomes expensive to maintain and build all this inhouse. i think as a bank we cognisant that we are actually very small players in the world market and we typically get bitten by international vendors. Our balance sheet can be smaller than some the smallest bank in India for example, so when it comes to playing in that international market definitely vendors are not giving us the attention we need and this is why we tend to favour building inhouse, but i think our fintech market in South Africa is definitely growing and we shouldn't always have to go international to find these, i think what we should be trying to do is to support the economy and try to see where are these little fintech's that offer so much of opportunity that we can support and help grow while helping ourselves in the same way, i think it's easy enough to do it's just the traditional mindset that needs to change in our space, i think it's starting to lean towards South African vendors.
13. What are other mechanisms can the bank put forward to improve customer experience in ensuring that existing customers are preserved. (is there scope to implement Biometric Technology	we have introduced a virtual card 'ok cool it's still a card' when we start to look at things like "Alipay" where you can pay with your face wouldn't it be such a really cool thing for our economy where you have a largely illiterate economy that would find it easier to pay with their face instead of trying to enter digits into a card

Participant 2

Demographic Information

Participant	**Participant 2**
Current Role	**Head of Operations I.T**
Years of Experience	**10**
Area	**Commercial**

Project Background & Context

- Industry 4.0 in Banking

Critical Research Question

- How can Bank A's Commercial Segment bridge the digital divide brought by Digital banks, to ensure they remain competitive

Theory concepts to derive Interview questions.

Industry 4.0 in Banking – Digitization	
Interview Questions	**Responses and field notes**
1. How would you define the impact of industry 4.0 in the Banking sector in South Africa?	Technology has actually impacted banks in a huge way, so I would say we no longer doing banking As we know it, as we used to do it due to the introduction of automated processes and all that, remember back in the days people used to go to the to the branches to do deposits for example on Saturday by by 2:00 PM. Bank branches closed and you can't then continue with depositing some funds, but these days you can actually do that. You don't need to go to a branch, you can just go straight to an ATM to do that. So banking has actually evolved because of technology, and also if as an industry as a banking industry we don't Adopt new technological initiatives. I see an opportunity for the smaller banks to actually take over like you mentioned that your Big Bang zero your discovery bank or those companies can actually take a huge number of our customers. If we don't a transform the way we do things and also embrace technology in that way will be able to continue to keep our customers and attract a Newer custom, especially the younger people younger People they prefer technology over everything else. So as a bank as a as a segment we need to ensure that we develop product those speak to the young people in order for us to be able to retain but over and above just retaining our existing customers we need to be attractive to new customers to young people and stuff. just to expand in on this topic. For example, an right now other fintech companies are actually going big. They are implementing blockchain technology in order to compete with the banks. So personally, I believe that if banks are not adopting blockchain technology, they

	might find themselves in trouble due to what is coming with the blockchain technology which is which in my understanding it is part of the 4th Industrial Revolution.
2. Describe the customer expectation within the South African banking market in this digital era.	Yeah, I think customers behave differently based on different reasons as you said, so there millennials who a more comfortable with technology and just having automated things happening on themselves without the user initiating them or a customer initiating them but when it comes to Our traditional old customers, it takes time for them to be comfortable with the digital platforms. With the technologies that we're providing as a bank, for example, there are still people who prefer to go to the nearest shop to buy airtime or else they can just use an app to buy item. Not that not that they don't trust the platform, but it takes time and an education for them to feel comfortable using such platform. So as a bank we need to cater up for both, But as we kept it for the old ones, we also need to have programs to educate our customers, because sometimes it's not a matter of them not wanting to use the platform or the functionality that you have provided as a bank, but it's just a matter of trying to educate them as well. Set so if on monthly basis there's this specific account that I keep on a paying or entering in order to make a payment, it is our responsibility as a bank to identify that using their tools that you have. Ok, this customer on monthly basis has been paying 10 grand to this account all the time So why can't we just propose that we add that as an automated payment service? We can do that as a bank, 'cause we've got the data we know since the past six months this person has been doing this. that means chances are he's going to continue doing it, you know. So just give it pop up and say, would you like to have this thing automated on monthly basis? Then if the customer says yes, then it's done. If he says no, And then you don't do it because you could find that maybe it's just paying a loan to his uncle. Yeah, that loan will be finishing in a couple of months. Or maybe you won't prefer to have it automate. But going back to comparing both customers the new and the old the new guy is actually very comfortable using the technology and they're very comfortable accepting all the automated processes. For example, we need to have, let's say you as a bank we have Intelligence to interpret our data and understand the customer behaviour. We've got one customer, he on monthly basis he earns 10 grand and he's got all these obligation to pay credits there and there and you find that to one of these months. He's actually spending A lot of money and

	you can already anticipate that you won't be able to meet his commitment when it comes to the credits that he had. So as a bank, we can then start selling product to that person, like your temporary loan in stuff like that. It is quite easier for the younger person to accept that then they all are passing because all personal like why are they selling me this product now. What triggered that. whereas the younger person will understand that we are using data To interpret the customer behaviour in that way, we will be able to then advertise products to our customers based on their behaviour. But as I said, it is quite critical for us as a bank to understand the different types of customers that we have.
3. What other factors slow the uptake of technology - does unemployment do?	Yeah, of course, and every industrial revolution over the years came with its disadvantages in terms of people losing their jobs, it's always an expectation whether you go full automation in terms of your systems or digitalising your platforms. You must always expect that some people lose their jobs so unfortunately, we can't really avoid that. At up to a certain level, we can try, but it goes back to education. It goes back to as much as we have to educate our customers, who also as a bank, has a mandate to make sure that to educate our employees as well, so that if there's a new technology that comes in to automate that job that I'm doing right now, which is a manual job. Then surely that new automation creates other opportunities somewhere else that I can then jump onto them so I know that's not possible for every employee, but I don't think we would that we would stop implementing an automated technologies simply because we are scared of losing jobs, I think if we do that, we'll be killing ourselves as a bank and also killing ourselves as a country. we need to educate our people and tell them about the opportunities that comes with new technologies, I think the biggest problem has been at people are not willing to learn and embrace new technology so that they can find ways to jump from their existing jobs to this. For example, some years ago there were securities at the malls and they were responsible for opening gates , but all that has been automated, but we still need people who would develop such software's, we need people who are capable of doing that. Any organization to decide not to implement a technology simply because it's going to take away jobs for people. I think it's a bad decision as much as it might sound that I'm not thinking for people, but I wouldn't take that decision, so I'm not going to implement simply because I'll take away jobs, I would rather find ways to create more

	jobs for these people, New jobs for these people instead of retrenching them i would find something for them, just like FNB decided that when you want to deposit money you don't need to go to a cashier you can And it just go to an ATM, But all those people who are working as cashier's, they've been deployed somewhere else, they were not retrenched but they were redeployed somewhere else, and they are doing different things. So obviously you must have the strategies. if you decide that you are closing branches, you need to ask yourself what i am going to do with my people, Let's teach them something else that I can do to bring value to us as a company and also bring value to them as individuals or as employees so it is critical, but it is quite difficult to strike a balance between the two, especially as you said we live in a country where there's lack of job opportunities, so when you destroy one job opportunity, you actually killing the entire family, so it is always critical that we consider that, but I think the best approach should be educating your employees and make them a capable of jumping onto any opportunity that comes with the new technology
4. Do digital banks pose a threat to incumbent traditional banks in South Africa What can be done to curb that threat	I'll say yes and no. Firstly, I was saying no. Simply cause if you can check the numbers of those rate of those accounts created in those smaller bank are Actually for a retail customers like you and I, people want to go for Capitec or bank Zero, simply for maybe for cheaper bank charges or for any other product. Or somehow we are attracted by a loan, someone went to Capitec the applied for a loan Capitec was less stricter compared to FNB, so in that way they've got the loan and eventually they decided to keep their account with Capitec so it could be a number. but when it comes to us as commercial banking, then I'll say that threat is It's a bit low because these guys are not really people are opening account for business. These are just people opening account for daily for daily basis transactions to buy airtime to send money to your family too. You know there are some other things, but then the difference is that such people can then grow to become your commercial customers in the future. So it is also important that you don't just no, we don't care cause these are retail customers, but there is a potential that same person can actually open an account a business account. So instead of opening that business account with FNB, they would open it with capitec simply because he started with capitec. So if we don't find ways to attract, Young people or to attract retail customers, Just keep them within the bank, so that should they decide to open an account should they

	decide to open a business account or start a business, it will be easier for them to opt for a business account within FNB then going and open it with capitec. So, it's always a good idea to attract them when they enter the big the banking industry. So also once you start them when they come in, we will be able to offer them other products as they grow in in terms of their career in terms of their business journey, so you can always be able to offer them such product. So, I think will be a pure reckless for a bank as large as FNB to just ignore the fact that younger people are actually going and an opening account in the smaller banks. We need to find ways to attract them as well, cause, As much as we might not be in a position to offer them a commercial product right now, but there's a There's a prospect that in future they might be opening businesses or requesting business Capabilities from the bank .

New Core Banking Application	
Interview Questions	**Responses and field notes**
5. Does the legacy core technology and architecture restrict the commercial segment from creating from realizing it's goal 5.1 What can the bank do to remain competitive in this regard offer a personalized customer experience	Are you 100% so the only thing that is actually hindering us from playing on the same level as digital bank it's because of A legal system or traditional banking processes. So obviously, in order for us to change something it will take up to two years, whereas when it comes to Bank zero, they will take a month for them to make changes. You know, because there's such a small bank, it's easy for them to change. Things or elsewhere for a bigger bank, it's actually very difficult to make changes as quickly as we would like to, so somehow our competitors are running faster than us. Yes, the bigger banks the top four or we are running at the same pace, but and now I would like to believe that FNB is faster than. The rest of the top four pack. But the smaller Banks have been running faster due to the fact that they don't have old system and over and above that in terms of regulation as well that they don't have 15 years old data, are sitting on the system. They just recently started. So regulators are not so strict when it comes to them. Compared to how they are strict when it comes to us as the big banks. So because of that advantage for smaller banks, they actually using it to thier advantage to actually run faster than us and over and above that they are actually in a position to adopt newer technologies quicker than us. As I said, in order for us to to to implement a new technology. It takes a lot, It takes changing the rest of the group, It takes a lot of administrative work. It takes a lot of Business process

	is change, so it just takes a lot. But if you go to the likes of maybe capitec or use captures an example or bank zero they can change faster than us. Due to that, yeah. So just to make an example, So if as a big bank, so right now if you need to do a cross border payment, we rely on this component, This international bank that does that, But because it's so old and big, it is really finding it so hard to to compete with the smaller fintechs who are actually using, for example, the blockchain to actually do cross border payment. So in that way it becomes easier for different tech companies or the smaller banks to implement the blockchain technology in order to remove the need to do cross border payment via this massive bank that charges us a lot But in order for a big bank like us to implement the blockchain technology this technology will come in with an added advantage to customers of making transactions almost instant, while the verification and the processing for normal cross border payments may take day, this functionality will allow the bank to settle payments within hours without charging the customers, oh it will take time but it will take a lot of effort in NH and a lot of regulations, so smaller banks have that advantage to change faster than bigger banks, even though they have limited customer numbers also maybe financially they must be restricted. So I would say the smaller banks are better positioned to to do that. But also having said that, I also believe that there are things that we can change as bigger banks It will allow us to continuously Compete with the smaller banks and be in a position to even attract new customers as well so it's not game over for big banks. I think there is a there is a scope for growth and there's a bigger scope for accepting or embracing and adopting new technologies.
6. Describe whether there more opportunities or threats of enabling digital solution on the legacy architecture	Yeah, I definitely your 100% right. So for any strategy that you implementing it in a Big Bang approach, you must expect that to be a lot of a lot of risk associated. It is part of the implementation, a strategy to ensure that you list all the risk associated with that and then you balance risk versus benefit, you know. It's always a problem to just go Big Bang, but some situations demand that if you don't do that then you lose totally, you know. But having said that, it doesn't mean that you have to then implement that strategy without opening your eyes, look left, look right and see what can happen. If you do that, having a very big team or a specialist that will be able to give you the necessary details in terms of the risk that you're facing or problem that you're facing and the potential solution to that. As a leader, whether you go Big Bang or you say OK, it's fine, We have lost those customers and let's try to to rebuild for future or rebuild for tomorrow. It depends how you approach that, You your strategy. But I

	personally feel like when you're facing a disaster like the one we faced last year, that demands you to act Now for now. For the next day and not to say no, we'll see what happens next, 10 years, because the situation demands answers now So if you face in such a situation It is very critical that you respond to it, but I think also building a foundation over time does help. that's why FNB are where they are at this stage. They've been able to integrate the systems in a way they've done, is not because they only started last year when Covid started. It has been on the cards as it has been on the platform we've been building, but we're not pushing it aggressively simply because we said no, we still have time. The integration can be done next day, no rush. But the moment we find ourselves in a situation that demanded us , for example, to work from home, then they had to make sure that all the integrations are completed like yesterday, simply because the situation demanded that. We were in a position to simply because we build the foundation over time, so each and every bank as much as you say, OK, I want to go for a digital strategy for the next 10 years, you shouldn't just fold your arms now and not do anything, you have to build your foundation. So that when the situation demands that you now fast track your strategy, you will be able to do that without compromising quality or introducing so much risk into your business process.
7. What should the bank do with its legacy core banking application, should it keep it or decommission it	Yeah, I, I think I'll go with a parallel approach where we say OK as much as we first, we do understand that the legacy system is actually forcing us to kind of delay our strategies to move to digital platforms, but we can't just fold our arms and say there's nothing we can do because also if you say OK, I'm not going to adopt any digital strategy right now. I need to remove the legal systems first I think, we do not have time to wait remember the process of actually decommissioning a system also takes time. 'll agree to a strategy that says, let's have parallel systems cause remember also as much as we criticize the legal systems and say they bad for this and that. I think it they give us a huge advantage in terms of data, so we've got a lot of data as as big banks compared to the small banks, data in this age is like a new oil. You know if I may put it that way, data is it's so important that if you don't have data as a bank then it becomes difficult for you to predict what, what, what the customer might do or even to build new product. Based on their customer behaviour, so big banks have a lot of data and they can use that data to build new products so they can utilize that to have an upper hand over the smaller banks. But having said that, the most important part is what you mention that it is critical to actually maybe take an approach of

	having a parallel system. you have your digital platform and you making sure that all the new customers are onboarded on this new S digitalized platform, And then the existing customers will be gradually migrated across to this new one, So in that way you are gaining new customers and at the same time maintaining relationships with their existing customers. You're not really breaking or losing focus on each of the two, or as if you just focusing on getting new customers, Then you're frustrating me as As an existing customer, then I'll go to another bank, or as if you're focused on me, you also losing a chance. Of gaining new customers as well so we have to strike a balance between the two, and I believe at this bank specific FNB it is actually doing that So we still have a lot of how consisting when we're gradual immigrating that to the platform and an integrating it is new cool digitalized applications with the existing stuff. In that way it becomes easy to. If you just use your app for everything, you know because that's what young people want if I have, My app, I have everything I'll do banking or buy my electricity I can pay for a my drivers lessons or can pay for this. I can send you a letter can do this, and I can apply for financing. Can apply for a mortgage you know I can basically do everything on my phone so, that's what young people want. They want everything to just work seamlessly. We know behind as a lot of integration efforts happening, but as a customer as a young person, I've just joined FNB as a kind of giving and within this app I can do a lot for me as a young person. It is so exciting because I just click and do everything but behind the scenes is a lot of integration involved. So that confirms that as a bigger bank, we still have an upper hand in terms of creating these very fancy apps due to the fact that we have legal systems of core a lot of data, we can do integration behind the scenes or else if you go and compare. in Capitec's case they've got a nice app, right but i can't do a bit like buying airtime, but it can't do much simply because they don't have legacy assistance behind it where they will fetch data for customers who have who are applying for loan in terms of mortgage or car finance and stuff like that. Capitec is aggressively starting to do that for example they bought a business bank. Now they integrated their accounts with ease equities, And I think FNB it somehow lost that opportunity and is now catching up with trying to respond to what Capitec and his equities are doing. It was easy, equities, basically they've gained a retail customers, young people who just wants to buy social shares by FNB shares and never had a chance to do that before because they were seen as something only restricted for fancy investors but is now is OK. It is equity is coming with the platform is saying. Everyone can invest. Come in will

	come with you. 100 bucks we can invest, you know. So now as bigger banks. Add section to document We're starting to see that or shared a lot of customers are now moving to capitec and easy equities using is equities platform and we are losing out on the prospect of finding those people, So we are now starting to respond on that.

Big Data Analytics	
Interview Questions	**Responses and field notes**
8. Describe how the bank can use data to develop contextual solutions	You know if I may put it that way, data is it's so important that if you don't have data as a bank then it becomes difficult for you to predict what, what, what the customer might do or even to build new product. Based on their customer behaviour, so big banks have a lot of data and they can use that data to build new products so they can utilize that to have an upper hand over the smaller banks so, if on monthly basis there's this specific account that I keep on a paying or entering in order to make a payment, it is our responsibility as a band to identify that using their tools that you have. Ok, this customer on monthly basis has been paying 10 grands to this account all the time So why can't we just propose that we add that as an automated payment service? We can do that as a bank, because we've got the data we know since the past six months this person has been doing this. that means chances are he's going to continue doing it, you know. So just give it pop up and say, would you like to have this thing automated on monthly basis? Then if the customer says yes, then it's done. we need to have, let's say you as a bank we have Intelligence to interpret our data and understand the customer behaviour. We've got one customer, he on monthly basis he earns 10 grand and he's got all these obligations to pay credits there and there and you find that to one of these months. He's actually spending A lot of money and you can already anticipate that you won't be able to meet his commitment when it comes to the credits that he had. So as a bank, we can then start selling product to that person, like your temporary loan in stuff
9. Are there any restrictions that prevent the bank from using data effectively	Yeah, I'll answer it in two ways, So firstly, so obviously the setup that we have right now as a bank You can say it's a physical data centre, right, I can also say it's a private cloud. Why am I saying it's a private cloud it's because each and every segment within the bank is using this one area and all our data sitting there. So obviously if as commercial I need data, I need new virtual machines, I just send a request to this people, then to create a space for me and they will charge me based on the space that I've utilized, so that's a private cloud. but in order for us to

	benefit more for cost saving or any other kind of cost saving that we may to move from the private cloud to a public cloud, public cloud it's going to use like of your AWS, your Microsoft azure, where your data will be sitting in the public cloud, But the problem now there are restrictions and regulations in terms of data. For example, one regulation says we're not allowed to host the South African data in a in a data centre outside our country, right? So that means even though you'll be using a public cloud, you must make sure that that cloud provider has a data centre in South Africa. So AWS has created their centre in Cape Town and they are busy with another one, i think here in Joburg and Google cloud as well is ready. They've got a data centre in South Africa Microsoft Azure already have a data centre in South Africa. If you can look your outlook it has been migrated, FNB migrated the data sets into the cloud So meaning right now is working from home. I can just go to any Internet and then just type Outlook.com. Then you put your F number will find all this guy belongs to FNB. Then they send your 2FA your app then you authenticate it, perfect. You know those are some of the benefits of using public but unfortunately not every system can be migrated to the cloud. We can only migrate data that it is not deemed critical at this stage due to regulations and data restrictions. I think the regulators become more less strict or they become less strict in terms of the data that you can put into the cloud. So, but if the data is not so critical, then so the strategy for the bank right now is to migrate data which is regarded as not so critical into the cloud. Gradually do that as we also engage with regulators and an ask for approval to move more data into the cloud, in so doing. that will help us to save a lot in terms of storage, Save a lot in terms of electricity because I run it your own data centre and also remember right now you could find that you go order a hundreds and hundreds of terabytes of space, but you only maybe using 20% of that, but you're paying for everything. Or else if you move that to a cloud. And so when it comes to the charge out model, when it comes to the cloud platform they charge you based on what you are using. So if this multi use only 20% of your allocated space then you pay for that. Do not going to pay for everything else, so that's where the cheaper are opportunities comes in in terms of the price that you pay as a bank or any organization. So yes, we are moving into the cloud. just over and above of moving your application onto cloud, other FINTECHS in order to integrate with them they will ask you whether you have your platform in a cloud so that they can talk to each within that platform, so if your systems are not migrated and are still sitting in a physical data centre. It means you losing opportunities to integrate with fintech companies who are already sitting in a cloud and they're waiting for us to be there so that our

	system can talk to each other. Right, if you don't do that, you'll have to open a channel between us as a physical data centre with the cloud in order to facilitate that integration. So yes, that that that article was quite 100% right and sitting in the in the physical data centre has its limitations. I think more opportunity opportunities are sitting on a cloud. so we have to make sure that our systems are migrated into the cloud as well going forward.

Industry 4.0 technologies	
Interview Questions	**Responses and field notes**
10. What Strategy or industry 4.0 technologies can the bank put in place to drive operational efficiency	Set if on monthly basis there's this specific account that I keep on a paying or entering in order to make a payment, it is our responsibility as a bank to identify that using the tools that we have. Ok, this customer on monthly basis has been paying 10 grands to this account all the time So why can't we just propose that we add that as an automated payment service. We can do that as a bank, because we've got the data we know since the past six months this person has been doing this. that means chances are he's going to continue doing it, you know. So just give it pop up and say, would you like to have this thing automated on monthly basis? Then if the customer says yes, then it's done. If he says no, and then you don't do it because you could find that maybe it's just paying a loan to his uncle. Yeah, that loan will be finishing in a couple of months. Or maybe you won't prefer to have it automate. But going back to comparing both customers the new and the old the new guy is actually very comfortable using the technology and they're very comfortable accepting all the automated processes.
11. What can we do to bank the unbanked community like street vendors that Tyme bank is largely targeting	Yeah, I think customers behave differently based on different reasons as you said, so there millennials who a more comfortable with technology and just having automated things happening on themselves without the user initiating them or a customer initiating them but when it comes to Our traditional old customers, it takes time for them to be comfortable with the digital platforms. With the technologies that we're providing as a bank, for example, there are still people who prefer to go to the nearest shop to buy airtime or else they can just use an app to buy item. Not that not that they don't trust the platform, but it takes time and an education for them to feel comfortable using such platform. So as a bank we need to cater up for both, But as we kept it for the old ones, we also need to have programs to educate our customers, because sometimes it's not a matter of them not wanting to use the platform or the functionality that you have provided as a bank, but it's just a matter of trying to educate them as well

Interview Questions	Responses
12 Is there scope to collaborate with third party organisations to drive solutions delivery	Yeah, I there's a bigger scope for that. I do follow the trends in terms of the banking industry around the world to what they do and the fintech's for example. Where at if you can remember MoneyGram, it is big in terms of sending money to do cross border payments so yeah, you could find that as a bank you don't have capabilities to build a particular technology to do payments, The only way is to utilize that technology is too is either you buy a software or you buy that company or but because remember fintech's are in a position to come up with a lot of very cool technologies.
13.What are other mechanisms can the bank put forward to improve customer experience in ensuring that existing customers are preserved. (is there scope to implement Biometric Technology	we also need to have programs to educate our customers, because sometimes it's not a matter of them not wanting to use the platform or the functionality that you have provided as a bank, but it's just a matter of trying to educate them as well

Participant 3

Demographic Information

Participant	**Participant 3**
Current Role	**Solutions Architect**
Years of Experience	**15**
Area	**Commercial**

Project Background & Context

- Industry 4.0 in Banking

Critical Research Question

- How can Bank A's Commercial Segment bridge the digital divide brought by Digital banks, to ensure they remain competitive

Theory concepts to derive Interview questions.

Industry 4.0 in Banking – Digitization	
Interview Questions	**Responses and field notes**
1. How would you define the impact of industry 4.0 in the Banking sector in South Africa?	So, I think technology has its benefits and it's got its pros and cons, right. So they are good things and bad things that we could take from technology. Some of some of the nice things that technology has brought in as pro in terms of automation and speeding up query resolution, account opening on boarding of our customers, So definitely with regards to all the new technologies in customer self-service applications that we've created that has streamlined the process vastly so where a customer would traditionally spend 6 or 7 hours in the bronze trying to open up an account and profile, it literally takes in five to 10 minutes to do those type of things online, so that's all technology is assisted from that point of view, from an ongoing maintenance Point of view, and customers being able to manage their banking themselves, I think so technology has a huge part to play in that. So if I have to start from the likes of online banking online banking before was quite basic security was very tight with the inception of OTP's, and basically we needed to Tighten those gaps as well so technology is assisted in terms of linking your cell phone to your online, Bringing out of the app that is made cell phone banking at your fingertips so you can even pay at your stores using my cell phone which technologies has enabled in banking. So that does make things quite easy, especially for your mid to upper income people where technology hasn't really assisted please with your lower income people who are rural based, they still require your traditional structure like branches where they can walk in and speak to a warm body. Because I mean, they are broadly uneducated, not familiar with technology, and I think so, That's where from a technology point of view, we could either assist

	them by bringing technology to them, We could have mobile branches, and then i think technology in it's current shape or form, i don't think it's benefiting those communities. yes, again for the upper income earners and educated, it has been broadly beneficial, But on the other side of the scale, not that that much
2. Describe the customer expectation within the South African banking market in this digital era.	I think so, if you had to go from top to bottom, your bigger guys like your Papa copper type of businesses, They expect everything to be done for them, so they want to click a button and it must just work. So, in that instance, I would say yes, the expectation from them is that the process must be seamless. If they paying a third party, it should be as simple as Speaking on the phone telling someone to pay someone, but over and above that they want the added benefit of knowing that their banking is secure that's then your corporates. then your SME's, i would imagine they want a little bit more control where they would maybe have an authorized representative who they trust to do these transactions on their behalf. You no longer have the owners of the business that that's going to the business and they can pass them certain functionalities and they can give them the authority to do it online, that's buy and large what the bank offers today, going back to the top one which is corporate, i don't think that is a technology play, That's more of a relationship play, and that's how I think it won't be in the future as well, so you've got your corporate who got their private banker and that person is basically doing the run arounds for them, and that's the way they like it, in that i can just phone anyone at my bank and they can just do all things that i require, then you got your lower end customer who are your sole props etc, who are single member business, they want total control, they want to manage their funds, they want to see what's coming in and what's coming out, i think that irrespective of whether it's a millennials or not they want to have that functionality at their fingertips, wanting to know immediately what's happening, because there are small businesses and are still growing, their funds are very important to them, they want to have sight of everything happening, so they would manage all of those things by themselves. In terms of Technology that you're speaking about in terms of third parties being able to, If I got you correctly, being able to take the money directly off the account, I think they want they they would they would like control over that type of function.
3. What other factors slow the uptake of technology	So, I'm going to say not as much as it used to. So, in terms of technology and the ended of new technologies coming to before, we are replacing people at an

- does unemployment do?	alarming speed so that fear of people losing their jobs. For retrenching is not as much as it used to be before, it's because of the climate that we are in. All it's all about the bottom line, right? So, I mean FNB is not going to come straight out and say it, but I mean you can see around you. There's a lot of these things that we are introducing that does reduce redundancy. There's a lot of jobs that that like you saying that a system can do, which could replace a human being very easy. So yeah, from an unemployment rate and basically getting the catch, so i think as long as it's meeting the bottom line. It is a concern, but not as huge of concern as it used to be in the past. I mean, we in the past we used to look at things like. If we implement technology, we used watch the retrenchment how it could look like, Can we redeploy those people that type of things, but those conversations are you and far between the more and more technology we can.
4. Do digital banks pose a threat to incumbent traditional banks in South Africa What can be done to curb that threat	I don't want to be biased towards FNB, so from a customer take up point of view, I would imagine it does impact the FNB, but then there's also other things to take into consideration, so once the customer service like so post take up, I mean, what's the retention period of those clients. What's the fees that they charge in, What's the interest rate that they are offering customers. Are all of those type of things competitive, and if they are then i would say yes they do pose a threat, If not its fine because the customer could basically start the process via client but not really blank was changing ourselves so it's all well and good to say I'm getting 70,000 customers a month. How many of those customers are they retaining and how many of those customers are being profitable. from that point of view, i don't think there is enough data to go on, Besides the fact that they are getting volumes in their business model still needs to be proven over time to say that it could they could be a force to be reckoned with, i think what FNB needs to do in response to that is maybe is to have a separate type of approach or marketing campaign to keep up with what they're doing in terms of the uptake of these clients.

New Core Banking Application	
Interview Questions	**Responses and field notes**
5. Does the legacy core technology and architecture restrict the commercial	So, I think you're speaking to the wrong guy with regards to that specific question, I've always been an advocate of legacy systems, right. So, at FNB specifically we have our own legacy system and the speed with which it can

segment from creating from realizing it’s goal 5.1 What can the bank do to remain competitive in this regard offer a personalized customer experience	process things. So, your mainframe systems are quite quick in terms of processing capability and power right. It also has capability and the ability to interface with external systems, your JAVA front-end. nothing is stopping you from providing the latest services at the back of your old technology, it would require some enhancements, but i don't see any issues with creating personalized offers. another reason i am an advocate for legacy systems, is that those systems have been personalized to such an extent that a lot of the product offering can be done in house without buying this commercial off the shelve systems, which first of all cost a lot of money to buy and then to implement, and also the service with regards to those systems, they come with huge costs in terms of maintenance. even though they might be advertised as off the shelve in terms of versioning and all those things you are tied up for quite a long time and you cannot as you wish, whereas with the legacy system you basically owning that technology and you can run with it and you can create whatever product you deem fit for your customer base.
6. Describe whether there more opportunities or threats of enabling digital solution on the legacy architecture	Yeah, I'm thinking basically, in my opinion, use the best of both worlds, right user processing capability and power of your mainframe and then combine that with your with your new type of technology that is your app, online, Java type of application using API Solutions and with the security measures that they have as well, so include the likes of OCEP type of technology all of those things nothing stops us from using them. creating this hybrid kind of model you are then getting the best of both, you are have the speed that the back end systems offers you and you have these bells and whistles that these front-end system is offering you that you can take advantage of
7. What should the bank do with it’s legacy core banking application, should it keep it or decommission it	I've always been an advocate of legacy systems, right. So, at FNB specifically we have our own legacy system and the speed with which it can process things. So, your mainframe systems are quite quick in terms of processing capability and power right. It also has capability their ability to interface with external systems, your JAVA front-end. nothing is stopping you from providing the latest services at the back of your old technology, it would require some enhancements, but i don't see any issues with creating personalized offers. another reason i am an advocate for legacy systems, is that those systems have been personalized to such an extent that a lot of the product offering can be done in house without buying this commercial off the shelve systems, which first of all cost a lot of money to buy and then to implement, and also the service with regards to those systems, they come with huge costs in terms of maintenance. even though they

	might be advertised as off the shelve in terms of versioning and all those things you are tied up for quite a long time and you cannot as you wish, whereas with the legacy system you basically owning that technology and you can run with it and you can create whatever product you deem fit for your customer base

Big Data Analytics	
Interview Questions	**Responses and field notes**
8. Describe how the bank can use data to develop contextual solutions	I think from that perspective we still at out infancy, we have data models but it's nowhere near to be sophisticated as we want it to be, so we are starting to play in those fields. But we still have a long way to go before we mature in that aspect of it
9. Are there any restrictions that prevent the bank from using data effectively	So I think we do have restrictions, but I don't think it's self-imposed restrictions, I think it's more legislative more than anything else. so more and more we are being restricted in terms of how we use in our data. So with the POPI Act and all other acts so it does hinder us in terms of making these innovative solutions available whereby for example we can pre-approve a customer for certain offers across more clients, it does make it a little bit difficult not being allowed to use the data as and when you see it fit.

Industry 4.0 technologies	
Interview Questions	**Responses and field notes**
10. What Strategy or industry 4.0 technologies can the bank put in place to drive operational efficiency	So definitely with regards to all the new technologies in customer self-service applications that we've created that has streamlined the process vastly so where a customer would traditionally spend 6 or 7 hours in the bronze trying to open up an account and profile, it literally takes in five to 10 minutes to do those type of things online, so that's all technology is assisted from that point of view, from an ongoing maintenance Point of view, and customers being able to manage their banking themselves, I think so technology has a huge part to play in that. Yeah, I'm thinking basically, in my opinion, use the best of both worlds, right user processing capability and power of your mainframe and then combine that with your with your new type of technology that is your app, online, Java type of application using API Solutions and with the security measures that they have as well, so include the likes of OCEP type of technology all of those things nothing stops us from using them

11. What can we do to bank the unbanked community like street vendors that Tyme bank is largely targeting	I think there is an opportunity to use AI to attract the unseen economy/street Vendor

Interview Questions	**Responses**
12 Is there scope to collaborate with third party organisations to drive solutions delivery	Yes, I think there are technologies out there that we could use so things that come to mind is like your robotics. Things where you could basically send in PDF statements and then the system could read and extract data from there and translate it for you. there are definitely opportunities to use these FINTECH companies for various models, information etc.
13.What are other mechanisms can the bank put forward to improve customer experience in ensuring that existing customers are preserved. (is there scope to implement Biometric Technology	it is, but with the technology that we have implemented like the face recognition and biometrics, you don't really need to remember your password anymore right, so I think we have mitigated that by introducing such types of technologies

Participant 4

Demographic Information

Participant	**Participant 4**
Current Role	**Business and Sales Head**
Years of Experience	**12**
Area	**Commercial**

Project Background & Context

- Industry 4.0 in Banking

Critical Research Question

- How can Bank A's Commercial Segment bridge the digital divide brought by Digital banks, to ensure they remain competitive

Theory concepts to derive Interview questions.

Industry 4.0 in Banking – Digitization	
Interview Questions	**Responses and field notes**
1. How would you define the impact of industry 4.0 in the Banking sector in South Africa?	Yeah, so I'm assuming when you say digital age right, you're speaking about the 4th Industrial revolution, right. So for me you know to be honest right to curb the threat right is obviously when you look at the 4th Industrial Revolution, you sort of looking at this rapid growth in technological sort of advancements, You're looking at, you know AI looking at machine learning and all these technology technological advanced you know aspects right. But now when we look at our economy, right, Our economy is quite unequal in a sense that you have a small percentage of wealthy people, and then you have quite a small percentage of people in the poor communities who can't even you know afford, You know, you know the day-to-day livings and expenses, So for me to bridge that threat right is to have some sort of a Uh, uh, I guess a financial inclusion type of message that you then drive to everyone regardless of whatever their earning potential is, regardless of whatever the standard of living is And bring them into this whole bank. You know, type environment and I mean as much as you say that you know most of these guys are not unbanked, they may be banked, but it's trying to have that holistic type of approach and include inclusivity, right in terms of financial inclusion and then that way you actually appealing to every different Segment of the market, and I think that's where the likes of your Tyme banks and would even say capitec etc., come in and that's how they actually acquire, you know new customers you know, at a rapid pace, right. So that's kind of how I see it. So for me is you can't really eliminate that threat for as long as you have Inequality in the communities that you try to Bridge that gap in.

	So for me internally I think we are embracing technology, you know, way beyond some of our other industry, you know counterparts or competitors, right. The challenge I think we have is we don't make that a reality To the man on the street or to the man in a so we're not reaching the masses in terms of some of the technology technological advances that we are bringing forth to the market, It's always, you know, to the educated type base, Maybe the effluent, etc, But then, how do you make The technology more appealing to, let's say, for example, an easy client or a low income client that earns you know maybe 0, to R50,000 You know a year, And I can tell you that you know for that client they might see FNB being you know innovative and everything else, But I can tell you now that they actually don't feel the advancement that somebody in a higher income bracket or in the affluent market you know would feel. so for me this is like a continuum, right, You have to make that technology that you need to market appeal to every single sort of customer you know based on segmentation based on demographics based on psychographics, And make sure that you know they are actually, Uh, fulfilling or making use of that technology as opposed to churning it out. So I think with us being at the forefront, yes, FNB is definitely doing quite well, But with us actually diffusing those technologies across our different customer bases and pockets, I think that's something that needs a lot of you know attention.
2. Describe the customer expectation within the South African banking market in this digital era.	Yeah, I think I think there's definitely an expectation, but remember the game we are playing in a commercial sense is i one of the touch contextuality, right. So you will find that this client is as it has gotten RM and then the expectation is for the RM to communicate some of these benefits You know to them and then you know our system in terms of you know adoption but obviously what has been happening is, you know, we leave it to the client to go and discover for themselves, and I don't know man if clients you know spend time you know looking at, you know what's out they what, what advancements are out there, They pretty much focus on their business and they don't, they don't know if they have time to be looking at new trends and all of that. so for me there is a willingness that internally we need to equip our own people to understand some of those capabilities, cause I can tell you what you're saying now is really there's a s a project called I'm not sure if you know it then EBP (electronic bill presentment), All right, it does exactly that, So it will tell you this is how

	much Whatever the services rendered was, Like are you guys giving us an instruction to then pay that supplier for whatever reason and then we need we click yes then you know that that message gets sent and then the payment is done, But I don't think that client themselves would have i guess the drive to discover that functionality or to even register or even find out about that functionality by themselves I guess it's up to us as a bank to say guys This offering is now available It's now, you know, push it and make sure that that you know that the adoption rates improves.
3. What other factors slow the uptake of technology - does unemployment do?	Yeah, for me is twofold, right, And I mean we can embrace all of these, you know, technologies, but you know what I think most of these technologies rely on usage and adoption, right. So if you've got low adoption rates, you know in relation to these technologies that we're bringing out then what is the purpose of using OCR if people can actually, you know, adopt it, or if they can't actually see the value in adopting it. So for the man on the street who still goes to, for example, the branch to check their bank statements is at what point in time will that person catch up to these advancements that we then putting forth. Yes, they would benefit the organization internally, but you know, does it actually benefit the man on the street or the man that is unemployed, or a man that is privy to this type of tech. So for me it's also as much as we have technology that's being brought about in all facets of the company, we have to look at the fact that there are still basics that we need to cover, That person must still be able to use some of the Channels that we have in terms of like it could be our know USSD in terms of checking their balances, It could be, you know, just general usage as opposed to going to a branch over time to seek a service, so for me it's, I don't think you know taking a client from like Anovas in terms of technology to an expert happens, you know immediately when we roll out these things It has to be a gradual thing, You have to consider you know that Continuum in terms of the different segments that which lifecycle the customer is. but i think if you take like for like in, let's say you have an affluent customer in Standard Bank and you take the same type of customer in FNB that customer in Standard Bank might still have the same issue adopting whatever technology that we present from an FNB perspective, simply 'cause he's accustomed to the way you know Standard Bank systems are accustomed to but, it does not make that person less savy from a technological point of view, so it's also how we do it. It's not what we do is also the how we do it in terms of making sure that there's that adoption, So if we if we focus on the what

	the result is, then going to be churning out a whole lot of technological advancements that no one actually uses. But then you bring the how element, To say that, OK, how do we then print this stick to this type of individual or this type of segment or this type of you know unemployed person or this type of business, then I think we will then unblock, you know A value in addition to what we will be bringing out to market, So the technology itself is actually useless It's actually how you, you, you communicate it and how you bring it to market and how you find ways to actually make sure that you know from an adoption perspective that they start using it
4. Do digital banks pose a threat to incumbent traditional banks in South Africa What can be done to curb that threat	So they are posing a big threat there, cause as much as the posing a threat to retail right customer needs involved, right. Those same retail customers can decide tomorrow they want to start a business, If they then make that decision, then obviously what first comes to mind is that i am banking with Tyme bank, so they will probably start off with saying OK, I don't want to move my banking products. I've got debit orders with Tyme Bank or whatever it is, I just want an account where I can facilitate my business transactions. The only issue would then come in where they want you know more complex products or more complex business products such as you know, structured finance and lending and all those types of you know. It's a threat from a retail perspective is definitely a threat for my business Perspective, I mean, some of these guys would potentially have side hustles or they would have you know business ideas that they want to put forth. So we mustn't just look at it as a retail threat, We have to look at it as a commercial threat as well because those customers in turn you know would then translate to becoming business clients in some shape or form. So for me is that entire continuum.

New Core Banking Application	
Interview Questions	**Responses and field notes**
5. Does the legacy core technology and architecture restrict the commercial segment from creating from realizing it’s goal 5.1 What can the bank do to remain competitive in this	I actually don't think so Hey, I think I think our legacy systems have been built to take on, you know, quite a lot more in terms of processing, because remember there is a legacy system in terms of processing and there is a legacy system in terms of what you can do, so if you look at the FNB app that we use, is still linked in some shape or form to our legacy system It terms of business functions, that we need to move away from and enable API solutions the front ends that we're using even be online banking still

regard offer a personalized customer experience	talks to our legacy system through the relevant business functions and customers like that experience, so they not really concerned about the back-end, They're more concerned about, you know, does this work. I would change my story in a sense that you know if the legacy systems have down time you have downtime or they have you know a huge network issues and all of that and that's a different story right, But from a usability perspective, I don't think that legacy systems you know limit us in terms of what we can do. and i think we have overcome that and i think what we sell to the market in terms of FNB app, Apollo, FNB online banking Those are basically Beyond industry standards, in terms of what we can do and be able to then provide functionalities which some banks can't even can't even you know with modern systems, i mean if you look at our eWallet, our eWallet type of offering, compared to other banks offering, like cash send from ABSA, send money etc from Standard Bank, ours is quite user friendly compared with thier, with thier you get like this long number that you must enter for you to actually withdraw your funds, You know we we have certain instances where we have pay to cell, we can just Pay to you without us actually knowing or having your account number etc, So and ultimately all of that is all supported by our legacy system, You know whether we want it or not our legacy system that we still able to get by with it, So for me it's more around, you know, not the legacy itself, but what but what and how we mask our certain front-ends to make them more modern, and i think we have done quite a good job in that.
6. Describe whether there more opportunities or threats of enabling digital solution on the legacy architecture	I don’t think it's a threat because no one has ever said our legacy core is unstable, as much as it is a legacy system, they might say that it can't adapt to a set of capabilities, but we have made that work right, we have made that work to a large extent, We've got nice front end systems packaged it, and things do work, and but you know, for me, from a maintenance cost perspective and the licensing cost perspective, that becomes an issue. And I think that's a negotiation type of discussion that needs to be had with the system owners themselves In terms of adapting that, but I think for me you know legacy systems and how they impact clients for me that's a bit irrelevant. I mean having a modern system is beneficial, in terms of you know, achieving economies of scale, you know reducing your CTI, but for me I always look at things from my customers lens to say that if it works it works If it doesn't, it doesn't. Right, regardless of whatever legacy system that you have in place or regardless of whatever new system that you have in place. If we can't, you know, maintain our existing systems in a more proficient

	manner then we always we obviously want to have you know, those issues. going forward, but yeah, I think for my maintenance cost perspective, which is a cost that the customer incurs, Yes, it is definitely a concern. In the sense that you know you might have all modules that are not adapt to new ways of doing things, but I can tell you now, new systems with old systems you could have a new system that is more problematic than the legacy system, I mean look at Standard Bank when they rolled out you know SAAS and all of that, I mean they had a quite a whole lot of issues, They had, you know, issues where they couldn't actually achieve, you know, a single view of the customer for whatever reason there was misalignment cause the way multiple systems that were not talking to each other etc. we've always had our Legacy System, and ultimately what it boils down to is, does it work or doesn't, I do acknowledge that Yeah, the maintenance could be an issue, but ultimately it's whether your systems are up and running at a point in time
7. What should the bank do with it's legacy core banking application, should it keep it or decommission it	I would obviously go for the a cloud enabled core banking solution, but with that it's also then to say what is your true source in terms of making sure that you've got the right security in place, making sure that you can still process all of those transactions, so you have to look at this thing holistically, so I think for me I would opt for a parallel type. Both Cloud and Legacy system you know supporting rather than migrating everything to cloud and then you've got nothing to fall back on for me it's about What is the most optimal interplay between your legacy system versus your new system, because for me migrating Completely leading out the old is a bit more risky than running both in parallel. So, I would opt for like a parallel type solution. We use both and we see how you know maybe see whether the synergies can coexist between legacy systems as well as the cloud based, you know, solutions that we're putting forward because I mean with the bank, you know, we obviously don't want to put all our eggs in one basket. We want you know something to fall back on, But in the same token, we're not saying that legacy system must remain as a core, we still saying that Are there possible enhancements that can be done from a from a core system perspective to make sure that you know we are then still able to compete in the market and that takes a dialogue between people who own legacy systems and people who want to consume it's services.

Big Data Analytics	
Interview Questions	**Responses and field notes**

8. Describe how the bank can use data to develop contextual solutions	So I think I think we definitely using the data to an extent, but I still think you know a lot more can be done from a contextualization perspective and I think that's why you know we've got these data hubs Building these, you know scoring model and contextual based type of solutions but even with that we don't want to infringe on our clients privacy elements. We don't just want to say, hey, today's your birthday We're going to send you something Or we saw that you've gone through this place we're going to, you know, send you something to that effect, I still think that you know there's a huge There's a huge opportunity in terms of contextualising you know, offerings to the client And we possibly only using probably 5% of that and I mean we can see it through some of the offering engines that we've built. You know, big three, maybe me predominantly pick three in terms of contextualized based solutions, but I mean we have to do more in terms of making sure that from a lifecycle perspective we offering you know what we need to offer, but we also have to do that in a in a more cautious manner because I mean, obviously, we've got privacy laws, is now marketing consent that you must have, there is also processing consent that is coming down the line, we can't just push all the time, We can, you know, sort of provide the customer you know the right products and services as they then opt in or engage with us. There is still a wealth of intelligence that we can extract out of the data that we have; I don't think we're using even half as much of that data to benefit clients
9.Are there any restrictions that prevent the bank from using data effectively	Yes, yes we are I think, as I mentioned, you know with the whole POPI program I mean, we obviously have to be compliant I think by June this year, And out of that you know there is marketing consent that we need from the clients in order for us to actually market to them, There is processing consent, So when we collect, you know information from the client, we have to disclose what we're going to be using that data for And that's all governed by, you know, regulation in terms of you know data privacy and security, etc, And there's also a global regulations that that we also have to adhere to. The GDPR that we also have to, you know, adhere to for clients who are UK Based or you have UK type relations, So there's that piece as well, so we can't just take data that we have on our records and just decide to to trigger off offerings or trigger off contextual solutions for clients, etc, We have to disclose upfront what we're going to be using that data for. So that's the main thing that we have to consider as part of this journey

Industry 4.0 technology	
Interview Questions	**Responses and field notes**
10. What Strategy or industry 4.0 technologies can the bank put in place to drive operational efficiency	There's always an opportunity for that, And I think you know, Again, data here plays a quite a huge role right in automation, I mean, if you look at today, you come into a branch or you go to online banking, you provide information that's required at onboarding, If you think about it, that information is static, right, Tomorrow my circumstances can change, right. I could then, you know, become a director of a huge company and all of a sudden, I've got inflows of cash coming in, and then I've got different Needs etc. So, for me, I think data and automation and processes must work together. So, where you have, for example, static data that has been captured on a system in a particular day. That data must be integrated to some sort of Third party that would be triggered at any point in time to then update what we have on our records so that you know contextually we offering you know clients you know better products and services you know that they need, But you know that's not happening. i mean we have got a whole lot of static data, You know as a result and the outcome then becomes, you know, quite distorted in terms of what the customer actually needs, so there's definitely always a need for automation, But then again, you know, with automation we don't want to automate everything in a sort of streamlines manner. You know, automation Can work for you based on the 80 & 20 principle, but you might have the 20% where you know you need to engage. You need to manually assess what you need to do depending on what the customer needs is and basically give them that right that right or that right outcome, There is definitely an opportunity to automate, but we need to automate where we can clearly see that there is a consistent pattern of behaviour, but when it comes to changing circumstance and all these other things. You know sometimes that warrants that doesn't require to mention that requires you know; you know some level of engagement that they do have that right
11. What can we do to bank the unbanked community like street vendors that Tyme bank is largely targeting	So, for me, I think it's always best to use everything that you have at your disposal, right. because it would help somebody somewhere, but it might not cover the entire market. For example, we have Obviously you know these guys who are vendors, but then you might find that you know a large percentage of some of these vendors are also foreign Nationals. Alright, so now when we use chat bots and all of that and now you want you use these chat bots to then speak in French or all of that. It might just be quite tall ask you know to try and provide. But for me, for those guys is more around you know Financial inclusion to say, you know you are part of us, you are part of our

	community, you are some sort of a citizen within the FirstRand sort of ecosystem, let's see how we can help you, so for me. This is more inclusion and then you know solving the needs while then being part of this you know sort of team or sort of base and then you know slowly giving them you know capabilities or product that they can then make use of, But yeah, but I mean wherever there is technology it will definitely help somebody somewhere, but it won't help the entire market It just depends on what those exact needs are. but for me the biggest thing is inclusion, include them first and then seek to solve the problems that they have

Interview Questions	**Responses**
12 Is there scope to collaborate with third party organisations to drive solutions delivery	Yes, I think definitely so for me, you know, innovation is only as good as People use it. So, the last thing you want is to put something there without, you know, assessing the need. So, if there's a strong need to do something like that, then you know it can definitely be done. But what you don't want to do is develop technology for the sake of developing technology, It has to reach the market It has to be beneficial, They have to access it, it has to be accessible in whatever shape or form, so for me it's about assessing the need and then defining the problem and then getting a solution around it
13.What are other mechanisms can the bank put forward to improve customer experience in ensuring that existing customers are preserved. (is there scope to implement Biometric Technology	So for me, I think it's always best to use everything that you have at your disposal, right. because it would help somebody somewhere, But it might not cover the entire market. For example, we have Obviously you know these guys who are vendors, but then you might find that you know a large percentage of some of these vendors are also foreign Nationals. Alright, so now when we use chat bots and all of that and now you want you use these chat bots to then speak in French or all of that. It might just be quite tall ask you know to to try and provide. But for me, for those guys is more around you know Financial inclusion to say, you know you are part of us, you are part of our community, you are some sort of a citizen within the FirstRand sort of ecosystem, let's see how we can help you, so for me This is more inclusion and then you know solving the needs while then being part of this you know sort of team or sort of base and then you know slowly giving them you know capabilities or product that they can then make use of, But yeah, but I mean wherever there is technology it will definitely help somebody somewhere, but it won't help the entire market It just depends on what those exact needs are. but for me the biggest thing is inclusion, include them first and then seek to solve the problems that they have

Participant 5

Demographic Information

Participant	**Participant 5**
Current Role	**Business Solutions Head**
Years of Experience	**32**
Area	**Commercial**

Project Background & Context

- Industry 4.0 in Banking

Critical Research Question

- How can Bank A's Commercial Segment bridge the digital divide brought by Digital banks, to ensure they remain competitive

Theory concepts to derive Interview questions.

Industry 4.0 in Banking – Digitization	
Interview Questions	**Responses**
1. How would you define the impact of industry 4.0 in the Banking sector in South Africa?	Yes and no, If I'm allowed to answer it that way, I'll tell you why I'm saying yes, so we were really giving it a full go. As you know, Lebo in terms of embracing the new technology, using artificial intelligence, following it with scorecards, models, and I'm talking now specifically from credit and we are talking from our accounts and customers perspective, I think our problem is at the bank are largely because of the threat that is coming from businesses, who are going to build a new base from nothing in which they don't have a whole existing technology stack that they're using that they need to convert that our huge disadvantage, and that's why these guys are real threat because their technology stack would literally be supporting New tech early, It would be digitally enabled only, and we've got existing massive stack of tech, As you know that we're using and that we need to consider when we trying to convert to the new technology. So that's to me, that's our biggest challenge that we got. we certainly trying to give it a go, we are really embracing the whole 4th industrial revolution in my opinion. I mean, you know you work with us and that's probably what we spend most of our days doing it with things like A.I technology, So the answer, in my opinion, is yes, we really are embracing it and the difficulty is in us competing with people that just create new technology stacks is we have to deal with our old technology stack in order to become competitive and that is hard. Your offering to new customers is actually quite easy because that's what you're offering is, so we've also got an offering component, little and the technology stack that our customers get used to, And that we would perhaps not accommodate if we said we're going to start a new bank and we're going to just, this is going to be offering, we

	would limit it, we would make it simple, We would make that that sitting on the correct technology stack that's my opinion.
2. Describe the customer expectation within the South African banking market in this digital era.	Because we're a bigger bank and we've got customers that are aged and different types of customers with different needs, Some people want to walk into a branch, We accommodate everybody like that and that's why we've got such t big overheads because we've got all our products out there, multiple products in multiple channels, including branch, So I think we can always do better, I think what we've done with Some of the propensity models that we've started working with only started working on some of those propensity models where when you try to do and I'll speak specifically on credit where you try to determine when a customer needs a credit product, and this should be basic, With, the customer needs a credit product, At what point in time, So that means you're looking at the transactions on his bank account. You look in his cash cycle and you see every year in November, for example, he suddenly he's got no money in his account, And then you look to his businesses jewellery, so then you go ok, well that makes sense because he needs to buy a whole lot of stuff For Christmas, so he needs funding. We should be looking at those type of models, propensity models and predicting what customers want a lot better than we do now. So we started having a go at this and we have had a bit of shot at it, but i think with COVID 19, we have lost a lot of focus on getting those models right, so if you're asking can we do better, Clearly we can, and I'm just speaking credit, yeah, and I think my father is another prime example is deaf, and he's got no Internet banking and he's got a car He goes to the ATM That's how he operates now. There is a high risk thing for somebody that age, but he's got no other choice at the moment, And if you if you went to Tyme bank, I don't even think they would give him an ATM because they just say you must do this, you must do your transactions digitally.
3. What other factors slow the uptake of technology - does unemployment do?	So are you suggesting that we're concerned about unemployment and retrenching people? Well, we're going to deploy the new technology an if we've got excess stuff Will try repurposing them or whatever the right term is that people use. Lebo, no, I think our biggest problem is I'm said earlier is that our technology stack is old and we need to move off that And then we're not building from scratch like these new guys, but to me the answer would be no, i don't think we worried about the unemployment component by moving on to new technologies, it's the reason like Capitec Bank was successful because they came in the product offering

	was simple, It was cheap and it was basic and people and people migrated there, but now they're having difficulties now, because now they need to move into the complex world, But now your technology stack is built out on a simple architecture and a simple technologies there, So now you need to move to the next level, i don't think that is considered and i don't think we worried about retrenching masses of people because we slow with the uptake of technology, I think it's the other way around, It's not that's not the reason we're slow if that's what you're suggesting. That we are slow because we worried about unemployment and retrenching a whole lot people, I don't believe that that's the case. And we, and we've had this evolution, and it has been slow for us, because when we started scoring, for example, I'll use that as an example, When we started scoring Yep, we had nothing you know quickly made system changes and got the thing up and we had (Scoring Model), literally from in six months it was up and running pretty much the way it works now. Now the hard part is that exists now, something else comes along and now you need to reconfigure the whole thing again. Now you need to collapse what you've got and build it out, that's like our new scoring engine like we are doing now, That is a hard piece of work to do. I don't believe it's something that is Worrying the bank that we can have a lot of people that we need to retrench or there will be unemployed once we get this 4th revolution, AI technology deployed in the bank and they yes, there's lots of opportunity to make use of this technology, but I don't know if all the use cases have been considered properly as well. but you know with AI technology, that's something that we're focusing on directly in commercial that is using to reduce workload, and people should be repurposed 1st. I'm going to give you an example I don't know if I told you when we started scoring our portfolio size I think was like 2 billion and then if I'm allowed to talk about these things, we had a portfolio size about 2 billion and we have 435. I can send you some of the stats 435 credit managers. We now have less than 200 credit managers and the portfolio size that's going through scoring is closer to 20 billion and we only retrenched three people and we actually got less, well, almost, We've got a third of the number of credit managers that are dealing with the applications, and that that statistics we keep to say, well, that is what we actually have achieved because we did repurpose people. Some those credit people went to sales when we automated the decisions. So i don't think that FNB is lying awake at night saying we are not moving on because we don't want to end up with retrenching people and then we worried about

	unemployment rate. We need to fix out judgemental scoring component, there are credit managers who sit on the credit committee to make judgemental credit decision whereas such things the bank could easily develop scorecard models to enable them to focus on other things,
4. Do digital banks pose a threat to incumbent traditional banks in South Africa What can be done to curb that threat	They are small players, but I think their threat is real. The challenge is we offering complicated products and solutions and bank accounts etc, Probably for the more sophisticated customers, but we have never really focused on the customers at the bottom where they just want to bank basic bank accounts, particularly in the SME retail space or on the consumer side, we always trying to sell them some sophisticated product, but the guy just wants a bank account any month, literally nothing else, We're not particularly good at offering that, and he wants it cheap and he just wants it on the digital channel. I don't think we focused on it, and I think they're probably targeting the new set of customers, particularly after the covid 19, where people are saying they want to do side hustles. So, in other words I need a cheap bank account because I'm not making any money and i can't incur any costs because I don't need any set of that sophisticated product. But I want to give it a go to see can I have a successful business open and a basic bank account somewhere digitally make it easy for me so that I can transact, I can pay some people, And I can get some money in and then I'll do my side hustle because that's the big thing that's coming out of that. And then we are seeing our of the SME retail space for commercial is the guys that are doing these side hustles. In other words, there was now selling shoes, My neighbour here is selling shoes, As a as a side hustle and people come and buy shoes from him so he doesn't need funding or anything that's complicated, Now that works well for them when they requirement from their customer base is simple and what these guys do these start-ups do they come in and they'll create that type and then they'll say they'll sell those customers to us, And then we'll then say, OK, Now we want to migrate those customers that have more sophisticated needs into our existing base, So there are threats from right at the bottom, If I can put it that way, But as they grow they might say, well, actually I don't need any sophisticated credit products, i don't need anything and my business is going fine, i don't need credit, And I don't need foreign exchange or I can go and do my foreign exchange it if need be, but I can still keep my cheapest chips bank account open with tyme Bank and i will open it with Bank Zero, but we did respond to bank zero, and we have our own equivalent

	of banks zero on the on the business side, And that that that's the scored credit you see, that's where the guys will have difficulty in Bank Zero because they might be able to give you a bank account, But then they need people that now I need to go and build scorecards, models. The credit thing becomes a complicated thing and that credit is normally When a business gets more sophisticated was in a growth phase, So in other words, the business is growing, so now it needs funding and there's no more funding because this decide ourselves that you're sending shoes, like my neighbour over there idea Now he's got no money, and now he needs a bank to fund him, now he has to go to a proper bank because he's not going to get the funding there, So the guys that are using these type of Accounts or really small Mickey Mouse Things that the bank hasn't focused on in the past, but that's an opportunity that we might have lost In my opinion, in other words, we could have had a whole lot more business accounts with small accounts cheaper than operating, where we make money in this bank. You know where we make many Lebo on lazy balances and that's where they are targeting. In other words, I get you open your bank account, you put your 800 Rand, and you put in your 2000 and it comes in your bank balance is 5000. You're not paying any interest, and we won't even charge you a fee, but we making money because we lend that money on to somebody else. That's where the money gets made in commercial because we pay people very little for their money and their cheques accounts and that's their target market, the tyme bank and specifically Bank Zero I think where we battling And this is an opinion is we are too rigid with our project Methodologies and processes, and we are too restrictive and how we put stuff in, I mean there the whole BRS process sign off the testing and it's extremely cumbersome,

New Core banking Application	
Interview Questions	**Responses**
5. Does the legacy core technology and architecture restrict the commercial segment from creating from realizing it’s goal	So I've got a few that might be slightly different to other people, our legacy technology. The answer is yes, it is actually because the way it's built, it’s not built for digital. It was built and then I was. Yeah, when we implemented our legacy technology in 1988 it was. There was no

5.1 What can the bank do to remain competitive in this regard offer a personalized customer experience	thought of people having working off their cell phones or going online banking that was that was people don't even think about that. We had just put ATMs into this bank. That's where we were and that was like wild new stuff that we were using at the time in 1988, In other words, ATMs were up and running and they were working, To some extent, we never had any digital presence, We know there was no such thing as digital, There was no such thing as app, So there were no such thing as cell phones when we built or bought that system. It was bought for that specific need. That's why I'm saying again with these new guys these start-ups, they're going to use their technology stack that is built for the stuff that they want to Execute on today so the legacy stuff is a problem because it was built for a specific need at the time. Yeah so, but then I know there's some banks in Europe that we had a look at. They actually went to France and had a look at them and what they did was they did pretty much what we were doing with the scoring orchestrating engine type of thing. We at the back end being the mainframe and then all of their gooey stuff was sitting on the front end so they still keep their mainframe but mainly for transactions and then the rest of their stuff is sitting off-host. In other words, they are using the store using the same technology stack, and they're doing extremely well, and they're accommodating the new people. I think where we battling And this is an opinion is we are too rigid with our project Methodologies and processes, and we are too restrictive and how we put stuff in, I mean there the whole BRS process sign off the testing and it's extremely cumbersome, Extremely time consuming and when Ryan came back he was telling me this was the last year, i think he was telling me that they still using the mainframe in France. That bank is doing extremely well and it's sitting on the old technology stack an however their front ends are all gooey like we did on our application sysem and they said they're doing pretty well, And but if you think about it, if you go back to 1988 you build a system that was fit for purpose. What is that thing? What did we buy in 1988? We bought a system that could post transactions. We bought a loan management system to manage a spectrum of loans, and we had the credit card component, So literally we put in a customer on a customer management system, we the transaction on the transaction management system and we have evolved this system, but it's getting to a point where it is not meant for and it's become expensive now as well. so people are doing the things cheaper and much easier outside of big mainframes.
6. Describe whether there more	So, there's two views, and then if you're asking for my opinion and some of the technology, yes. So for example

opportunities or threats of enabling digital solution on the legacy architecture	the way we built our scoring orchestration engine probable needs to be rebuilt. But I still see the transactional component and the loan components and the stuff we originally bought for the customer information sitting on the mainframe, It was a single source single reference that kind of makes sense to me so Take a bit of the old that we had and implement the new on the top of it, And the reason you want to do things like that, in my opinion, is because to move from an old technology stack to a new It's hard as Standard Bank done with SAPS and they know that it's been a mission. and i don't think that they are there yet and there are billions down, and by the time you realize that SAPS is no longer the latest thing, So you gotta be careful in what you ask for. Yeah, so maybe you need to use the best of the old World, which is some of the legacy functionality we got, Like we do use and then put it in with applications that can be supported on the top end. And what we did was many years. Well, we built the scoring engine in 2012. I think it was that was kind of what was in our heads at the time we were building that credit portal. the Whole idea was what our users would go to the same place they would get the excesses, raise the applications, the limit man and all sorts of things there. So it was a central repository, same kind of mindset. We've got now. But now we just using Different technologies to do it. And I think things like we're doing The new scoring we're going to open up way more opportunities for data in the scoring world going forward, so I think it's the right thing to do, but there's still some competency's or some things that the legacy system could have been kept for old technologies that but, but like I've said to another more, you think about it, the more you say. If you were starting a business, I wouldn't buy IBM mainframe.
7. What should the bank do with it’s legacy core banking application, should it keep it or decommission it	when we implemented our legacy technology in 1988 it was. There was no thought of people having working off their cell phones or going online banking that was that was people don't even think about that. We had just put ATMs into this bank. That's where we were and that was like wild new stuff that we were using at the time in 1988, In other words, ATMs were up and running and they were working, To some extent, we never had any digital presence, We know there was no such thing as digital, There was no such thing as app, So there were no such thing as cell phones when we built or bought that system. It was bought for that specific need. That's why I'm saying again with these new guys these start-ups, they're going to use their technology stack that is built for the stuff that they want to Execute on today so the legacy stuff is a problem because it was built for a specific need at the time. Yeah so, but then I know there's some banks

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Big Data Analytics	
Interview Questions	**Responses**
8. Describe how the bank can use data to develop contextual solutions	So for example, in your use case, the guys that are coming from tyme bank or banks Zero will say that is our process, And you need to fit in or we don't really want you because they've got a very linear process, In other words, it's straight line, it's just that's how they operate. Because we're a bigger bank and we've got customers that are aged and different types of customers with different needs, Some people want to walk into a branch, We accommodate everybody like that and that's why we've got such t big overheads because we've got all our products out there, multiple products in multiple channels, including branch, we can offer solutions on enhanced digital platform, So I think we can always do better, I think what we've done with Some of the propensity models that we've started working with only started working on some of those propensity models where when you try to do and I'll speak

	specifically on credit where you try to determine when a customer needs a credit product, and this should be basic, With, the customer needs a credit product, At what point in time, So that means you're looking at the transactions on his bank account. You look in his cash cycle and you see every year in November, for example, he suddenly he's got no money in his account, And then you look to his businesses jewellery, so then you go ok, well that makes sense because he needs to buy a whole lot of stuff For Christmas, so he needs funding. We should be looking at those type of models, propensity models and predicting what customers want a lot better than we do now. So we started having a go at this and we have had a bit of shot at it, but i think with COVID 19, we have lost a lot of focus on getting those models right, so if you're asking can we do better, Clearly we can, and I'm just speaking credit, yeah, and I think my father is another prime example is deaf, and he's got no Internet banking and he's got a car He goes to the ATM That's how he operates now. There is a high risk thing for somebody that age, but he's got no other choice at the moment, And if you if you went to Tyme bank, I don't even think they would give him an ATM because they just say you must do this, you must do your transactions digitally. Can we do better, Yeah, absolutely is a lot to be done. I can just think of stuff that we wanted to do on the credit side alone where we sit, Let's look at our models and the specific one is the propensity model, so it's ended with what is the chances that customer is going to take up that product at a specific time, And what are those events that you're looking to determine when he takes up that That product will that event when it occurs that we offer to him at that time, because that's when he's going to say yes I need it and I yes I need it right now so, Have we done well now, Can we do better, yes we have We started this journey, yes, so that's kind of where we are if you be.
9. Are there any restrictions that prevent the bank from using data effectively	Our restriction has always been, and you also know this, our data is stored in multiple warehouses, so we store data as per use. For example, I will tell you what used to happen in the past. If we had a credit application that data would sit on the system database, so what happened is nobody had access to that information. One of the things that FNB realized and that's why there is a lot of focus on data insights is that we need to get all out data into a single reservoir and that's why that external data mart, external data warehouse (EDW) so the mart is within the warehouse. Once your data is in a single repository then you can start using it. We didn't have that, and I think we have made good progress, but we still have a long way to go to get there. Because then you can use your data, if you don't have all your data points in a single pace, how do you

	determine for example what I was telling you now on the propensity model. How would that work if you didn't for example what industry he was, what his transaction reference is like, what his existing facilities is like and what collateral has he got. All of that data needs to sit on one place. That's what we doing in the bank right now, how do we get better in using that data, if it's not in one place then you can't use it effectively. Just on the naming standards of our fields that we had on our systems, we had different names, so like what's a customer name, is it a client name is it a customer name or is it Mr First, is it the customer's registration number and how does it work, we had to get all through all those hurdles as well, I don't know. And it happened in the past because our systems that we built and our processes that we built were not built for the current day in the future in other words we didn't warehouse all our data in a single place because we didn't need to. If I wanted to see what application data is there I went into my own database but everyone wants to share I that data and how do we use that data across the whole group is that you need to put it in single repository and you need to get the naming standards to be aligned and how do you determine these values that are sitting there, how do I use it effectively and that's a mission. I think we are taking the right steps in the right direction but we not seeing the rewards yet and not that COVID 19 has caused us to not know whether we are getting the rewards or not. We need to fix out judgemental scoring component, there are credit managers who sit on the credit committee to make judgemental credit decision whereas such things the bank could easily develop scorecard models to enable them to focus on other things,

Industry 4.0 technologies	
Interview Questions	**Responses**
10. What Strategy or industry 4.0 technologies can the bank put in place to drive operational efficiency	there's lots of opportunity to make use of this technology, but I don't know if all the use cases have been considered properly as well. but you know with AI technology, that's something that we're focusing on directly in commercial that is using to reduce workload where there is a constant pattern, however people should be repurposed 1st. I'm going to give you an example I don't know if I told you when we started scoring our portfolio size I think was like 2 billion and then if I'm allowed to talk about these things, we had a portfolio size about 2 billion and we have 435 credit managers. I can send you some of the stats 435 credit managers. We now have less than 200 credit managers and the portfolio size that's going through scoring is closer to 20 billion and we only retrenched three people and we actually got less, well, almost, We've got a third of the number of credit managers

	that are dealing with the applications, and that that statistics we keep to say, well, that is what we actually have achieved because we did repurpose people. Some those credit people went to sales when we automated the decision
11. What can we do to bank the unbanked community like street vendors that Tyme bank is largely targeting	Yeah, unless we come up with another solution, It doesn't need an expensive back end process that's sitting there. In other words, if he wants to go on his cell phone and he wants to pay somebody we using the old mainframe architecture in the background to orchestrate all of that and, Yeah, I think it's just about strategy, is that is that what we want to target. Do we want to bring those customers into our existing cost structure? It can't work, and that's why the whole thing with like we did with the Zero Account, we made it very clear to our customers that they're not allowed to go into the branch. If they do, they're going to pay a fee, because as soon as they belong to FNB, they automatically get this idea that they can walk into a Branch and I can't solve my problem digitally, so I'll just walk into the branch. Well, phone a call centre while do something, and then that's where that's where we end up with issues. Many years ago, we started branches that were designed, Specifically, the division was called Smart, so we just offered low cost products to the masses, that was it. We wanted to say you can come in here and get a cheap account, but we both the infrastructure there as well On the branch side of things and that whole thing collapsed because of the cost structure, because then you're maintaining branches, it's premises, it's rental, that stuff and it becomes extremely expensive. So the trick with the customers is if they haven't got an option to go to a branch like the new tech stack, I would buy something like somebody came up with and if they came up with it and you would keep the brand separate even you wouldn't make it Wouldn't make it known that it's from FNB. And then once those customers you've got the customers on the new tech stack from the start-up and then say to them, Now we want to migrate those customers into FNB when we see the turnovers get bigger than their business becomes more complex that they actually possibly need credit facilities that it's not just the guy that buying fruit and vegetables so he once a week he or he goes to the market. He pays 300 Rand for his fruit and vegetables out of his account, He comes back with his vegetables. He deposits the money into the account, How does he deposit the money into the account, That is the top of his bites that we've had with lots to say I don't know how we make money out of those people, That's the problem, unless As soon as you allow that infrastructure that we've got, if it needs to be used, then the product doesn't stack up From a cost perspective, so I know when we did the debates in commercial, we just make it abundantly clear to the customers they can't go into the branch if they do, they're going to pay a heavy cost and then they must apply online for credit, they must do their

	banking digitally, they cannot go use the infrastructure but as soon as they do they then it becomes a costly process

Interview Questions	**Responses**
12 Is there scope to collaborate with third party organisations to drive solutions delivery	No, let's say you excited about working with us on this new project. We have no legacy, now we can build what we want on that SID because it was never in a system, there was no scoring it's been nowhere. That's what makes that type of thing easier for us because you don't need to consider your existing Tech stack. There issue of buying a new business or getting one of the new guys to come in from one of these businesses they not going to know how it works here, they might be able to build this brand new solution for you then maybe yes, but if you don't know how the existing tech stack works then how do you build it to accommodate those problems. That's what makes it interesting and nice we don't need to worry about the tech stack we can build what we want, we can put the scoring and we can just put it the way we want. what makes it hard to get everything hard to get everything onto our tech stack is the existing architecture and I think that's some of the challenges that we have in our existing architecture and our business processes. So for me if they have a customer base, let's say Tyme bank and we go to Tyme bank and say we will buy your.. and that's what's going to happen. These FINTECH's they do all of these things so that they can get a bank to buy them, they actually don't want to own a bank they don't want to own the business, they want to create something new so that someone else can come and say we will buy that from you now because you have a whole customer base and you know you starting to make some money and you going to battle yourself to start dealing with these complexities that we really know about because we built systems and for that let's go and buy a FINTECH, so buy their technology and buy their customers, because the next level is the complicated stuff that customers start wanting that we have accommodated from doing 175 years of doing banking.
13.What are other mechanisms can the bank put forward to improve customer experience in ensuring that existing customers are preserved. (is there scope to implement Biometric Technology	As soon as you got branch infrastructure, you got stuff cost, you got Rental, it just becomes very costly process and then again you can't offer those type of guys the product that they're looking for, the cost that they looking for. So, it's the plan that FNB is trying to get right, what we really trying to do is we want to be the bank for everybody. I don't know, maybe There is a lot of opportunity The reason why cell phone banking is worked in the rest of Africa, largely because they don't have a middle class like we do here in South Africa, So they're only offering you could give somebody is cell phone banking in the likes of Kenya, where they've had all those success stories, I'm sure you've read about it. Just offering them a cell phone Banking with little bit to transfer

	money, pay for goods and receive money that's it. There's nothing else that they get, and they do that on their phone and they've been very successful. Some of those businesses that are out there, but those because the middle-Income earning customers so they don't have too many They have to find an offering that suits us. So where do we make our most money from the average Joe's Open from their small business where they're turning maybe a million Rand and less an or million random. Or that's kind of where we targeting to make our money. So I do want to bank for everybody. I'm not entirely sure, I don't think we should. I think yes, it's an opportunity to buy some other company, Business it's already offering that you keep the brand separate and then you move your customers when you need to from there When you recognize that they more complex into your existing FNB brand, What you got is if we add this in the smart branches In the past we now you got the guy who walks in there or branches where the guy walks in there then turns 3,000,000 Rand a year And now he's going to. He's standing in it beyond Q behind all these guys that are standing there to go and solve while they tried to. They actually deposit 300 rand a week into their bank account and that's always been What do you do cause that customer walk away and you'll find an offering that he says I want to go to that offering and that's how they end up at. So then you end up with the licks of discovery that people that are offering you something else. So the guys that who's a big competition in the upper end, uhm, they were visiting my daughter She's trying to be a chartered accountant trying to get it to bank with them. Yeah mistake, they came around and they came and presented to all these Chartered Accountants and pretend Chartered Accountants or I'll call it potential occurrences Then contract CA. Beyond that, they've done the exams but they need do the articles, So then they come and they offer them and they said don't worry you just phone me I'll sort it out so they attack you upper end cause you don't want to have and they said no you don't need to go to our branch will solve that problem for you, Now that's an expensive model but therefore you need to make money out of those customers, So do you want to be the bank for everybody. We've been trying to do that, but we haven't really focused on the really lower end of the market to well., So we've got our private clients facilities, we've got RMB private clients facilities, i don't know how they compete against Investec. But Investec seems to be quite aggressive in that market where they actually targeting specific customers, Like doctors, Chartered Accountants and the likes. We're not disagreeing and that's what I'm saying But the offering needs to be a different brand, Otherwise, how do you connect your brand. Save your brand, if you want to be known as the really professional bank. I mean they come and present to My daughters are all extremely well spoken, presented

	extremely well That's your offering, Are we now trying to say we're going to do the same offering for the guy that lower in that depositing 4000 Rand, in his bank account, No you can't . You don't be the bank to all, but that's why if I was part of this, I would be saying we do need to look after those customers, That's why I was suggesting outside, Again, we actually want to look at buying some FINTECH, Some Business, whatever it is that can accommodate those customers, that gives us that opportunity, that's a separate brand, that we can move that brand into FNB when you can easily , In other words, when they operating there you can say Oh well we can move you now to FNB, don't you want our offering, Because we've got the data, We bought that and it's a separate offering and it shouldn't be connected FNB other than when we want to move you across it should be an easy process to move. we would say we recognize you; don't you want to move to FNB be part of the group. So, like direct access is a very specific focus that's its own brand Direct access, West Bank is the same thing. It just says we do wills and it could be the same thing that you're offering and then you bring them into the FNB fold

Participant 6

Demographic Information

Participant	**Participant 6**
Current Role	**System Owner**
Years of Experience	**34**
Area	**Commercial**

Project Background & Context

- Industry 4.0 in Banking

Critical Research Question

- How can Bank A's Commercial Segment bridge the digital divide brought by Digital banks, to ensure they remain competitive

Theory concepts to derive Interview questions.

Industry 4.0 in Banking – Digitization	
Interview Questions	**Responses and field notes**
1. How would you define the impact of industry 4.0 in the Banking sector in South Africa?	Within our environment, I would say so, we have won a couple of awards for innovation. As far as I know we are ahead of other banks as far as scoring goes in the business segment. The future is going to bring in a lot of changes, there is a lot of focus on how we do scoring with the X-journey, i think the X-journey will do a lot of future proofing, i think it might be a little bit difficult to future proof. there is obviously compromises if you modularize for instant, one of the risks of modularizing is, you end up with scattered in different models. the benefit of modularizing is that if the future direction turns out to be slightly different to what you anticipated which often happens, modularizing makes it a lot easier to adopt without throwing everything that you have done and i think that's why we modularizing, the disadvantage is that it does make your programme less cohesive. you will be using multiple databases because you are modularizing, therefore, to makes sense of the data, the data needs to be joint. there are teams within FNB looking at machine learning and artificial intelligence, i know they

	have designed their predictive models which can look at customer behaviour and initiate a chatbot to the customer based on whether the, this is more big data rather than machine learning, but i think there is a machine learning component as well, it will initiate a chatbot based on whether the customer is expecting a child based on the customers banking behaviour and obviously they have not launched it because there is quite a risk if you get it wrong, but they did it offline, so they did the scoring as though it's live however the chatbot was not sent to the customer and they had over 70% success rate, more than 75% of the time they were able to predict that a couple is about to have a baby based on their banking transaction. so they obviously are people looking at this kind of technology
2. Describe the customer expectation within the South African banking market in this digital era.	to me one of the challenges we face is we would like the self-service channel, the self-service (scored), automated, web-based banking to be for our low profit customers, because that reduces the costs. The problem is that it's exactly those customers who are more likely to resist self-service. i know when we did online, we put a programme to allow a customer to request and increase in facility, we were targeting that at smaller businesses, we were surprised to see a lot of mid- corporate trying to take it up. So we do have a bit of a split economy where we have customer to whom self-services really appeals, and i am one of them, i hate speaking to people, as soon as i get told i need to speak to your relationship manager, my first question is why do i have to speak to someone, why can i not do it myself and why can't i do it myself, and i think we have a lot of business customers who have the same attitude , i don't want to speak to somebody else, i don't want to have a relationship manager, i don't care of a relationship manager. i want self service i want to do things myself, and we have another set of customers who value that relationship and i think it's a lot smaller than what we think it is. i don't think that a lot of customer who don't want a self-assisted channel are there because they want a relationship, i think it's because they are too unsophisticated to take up the self service channel, that's a problem because you have a high cost customer is very low profitable.
3. What other factors slow the uptake of technology - does unemployment do?	there is definitely, I wasn't really involved in this other project, but I know one of our SME's was involved, ultimately what we want is to cut out the middle man basically, we want the customer to send his financials

	presumably in a PDF format, we want technology to be able to read that, i know that presents some difficulty in getting it to reliably read that, and then import he data from the read and do the spreading on the data, and basically what we want is the customer is to send through his financials, spreading gets done automatically and it goes off to credit. i know that there is software available that can read PDF's. Depends on, i think people like you and i in the environment that we are in, i don't know about you, from what i have seen is that you work the same thing that you worked. you look at what value too can add, the focus changes from doing the job that i am instructed to do to looking around you to looking around you to say how can i add value, and then you get skills that allow you to add value, because your job satisfaction is so much greater when you add value. you putting in a lot of work and a lot of work that you are putting in is to allow you to add greater value to your work, and i think that's very much how the work of work is changing, it's changing from i am a set of tools i offer you my hands, you tell me what to do, to sort of a self-motivated thing where you get me an environment and tools and i look at how i can best use them, and i think it's going to be a change for a lot of our staff and they need to actually start thinking like that, probably not in our space maybe the relationship managers or i don't know the credit managers in some of the regions are still very much focused on i come in and i sit on my chair and i wait for the work, and i think COVDI 19 will start making people to start thinking like that, you give me a chair to sit on and see how i can add value, i think it's great and it gives people opportunities as well to look at how they can add value which is good for the bank, but also gives people to look around them to see what tools they can have to add value. People should start thinking to say if you send me to this course this is how i will add value rather than waiting for work and say now you need to send me to this course. So for instance if somebody is sitting in the credit factory the challenge is to say if you automating this, i am not longer going to be capturing data and doing spreading, what else can i do. can i perhaps suggest that we could source some of this data from SARS if we had a better relationship with SARS, work on that project rather than work on the manual data capture. So i wouldn't say it's completely up to the individual, i would say it's largely up the individual, there is very little that the bank can do without the

	bank contributing, i think the bank's responsibility is to start making people aware that the world of work is changing. So the Bank's responsibility is to make people aware. Udemy which is one of the learning platforms. making the tools available and making people aware that there are opportunities available and they need to look for them. the bank can't motivate people, people have to say what value can they add.
4. Do digital banks pose a threat to incumbent traditional banks in South Africa What can be done to curb that threat	I think Capitec has shown us the risk that comes from the thinking that a new bank is small and will never have the right to be a big bank, on the business side we still relatively protected because Capitec hasn't really gone into the business market, but i think it's only a matter of time before they do. a lot of the small banks will probably position themselves as niche players, rather than trying to compete with the big banks but we certainly can't afford to be complacent, they do definitely offer us a challenge. i think there are a lot of businesses that are looking into migrating into banking as well. i know discovery has been looking into getting into banking and their target will probably be in the upper end of the consumer market.

New Core banking	
Interview Questions	**Responses and field notes**
5. Does the legacy core technology and architecture restrict the commercial segment from creating from realizing it's goal 5.1 What can the bank do to remain competitive in this regard offer a personalized customer experience	We do have a lot of legacy weightage, the inertia created by existing infrastructure vs. the leverage you get from that existing infrastructure. I don't know, but I think it might make it easier to give customers what they want because you have existing infrastructure that you leveraging of, it often becomes costly because you trying to adopt it to existing technology
6. Describe whether there more opportunities or threats of enabling digital solution on the legacy architecture	I think it's more of a threat that an opportunities, I think the opportunities are greater for businesses that do not have legacy systems, the only way to go for them is forward, I think we can retain our legacy core more for transactional use as a database, i know some other banks like standard bank has moved from the mainframe technology.

7. What should the bank do with it's legacy core banking application, should it keep it or decommission it	I think it's more of a threat that an opportunities, I think the opportunities are greater for businesses that do not have legacy systems, the only way to go for them is forward, I think we can retain our legacy core more for transactional use as a database, i know some other banks like standard bank has moved from the mainframe technology.

Big Data Analytics	
Interview Questions	**Responses and field notes**
8. Describe how the bank can use data to develop contextual solutions	A big challenge at the moment is that we have quite a lot of data warehouses that can't integrate with one another, you can't look at the data of two different systems on the same query. That's one of the things that we are busy with, we have created a multi tenanted data warehouse. The idea of a multi tenanted warehouse is that although it has different tenants to accommodate different requirements, the data meets the common standard and thefore it can be accessed within the same warehouse. It's going to be a difficult journey because we haven't had a single architectural view of our data, we trying to go there now and we are now sitting with legacy issues, and i think we have a long way to go, for example if you a have customer number do you permit the system that is using the customer number to change that customer number, for instance your trading account it's a separate system, tradeline. it's a separate system and it retrieves the customer number from the customer information system initially, it uses the customer number but if there is a customer combine on the customer system, then the customer information system still retains the old customer number but it now has a new primary customer number and tradeline doesn't participate in that, so tradeline will still have the old customer number. that shouldn't be acceptable. you should be saying there should be one customer reference number and everybody should use the same customer number for the same customer and how you manage that it's quite difficult and it would create some issues. That's the big data challenge, to try and work out what the customer wants rather than merely what we are prepared to give, and of Corse what the customer wants we can influence, if a customer thinks he wants an overdraft and we would rather give him a loan. It's a very difficult conversation

	if the customer asked for an overdraft and try and counter sell him a loan and if we had made an offer upfront, we would be prepared to say we could offer you a loan but we know at the back of your mind that you want an overdraft, but we can offer you a loan is a lot easier than saying well we can't offer you an overdraft because we don't want to, and we can give you a loan instead. It is difficult but will be our biggest challenge trying to build a model that would match the customers need to what we can offer, often when the customer doesn't know himself what he would like. In the years gone by we expected the customer to come in and say i want an overdraft, i don't want a loan, now the customer comes in and says i need money. and basically that's what we want it to be, we don't want the customer to be sophisticated enough in banking products to tell us what he wants, we want to be able to match what he wants with what we are prepared to offer, so that we can pre-empt and offer before he even ask, it would be a difficult model to build but it would be a great challenge. i think we do have some data analysts working on that kind of thing, but i don't know if it has that higher priority, but i think it's going to be very important.
9. Are there any restrictions that prevent the bank from using data effectively	Yeah, so for instance POPI or the requirements of the POPI act it's going to, or as you know I don't want to hold customer information data on an orchestration engine database because of the POPI act, and I don't want to have responsibility to that data particularly when i didn't originate that data, which then means on the one hand it's a good thing because there is one version of the data and you don't have inconsistencies issues where you have different versions of the same data with different information, but it also makes it a bit difficult to use the data. It would be convenient to have the data duplicated rather than having to source it from different tables. A big challenge at the moment is that we have quite a lot of data warehouses that can't integrate with one another, you can't look at the data of two different systems on the same query

Industry 4.0 technologies	
Interview Questions	**Responses**

10. What Strategy or industry 4.0 technologies can the bank put in place to drive operational efficiency	there is definitely, I wasn't really involved in this other project, but I know one of our SME's was involved, ultimately what we want is to cut out the middle man basically, we want the customer to send his financials presumably in a PDF format, we want technology to be able to read that, i know that presents some difficulty in getting it to reliably read that, and then import he data from the read and do the spreading on the data, and basically what we want is the customer is to send through his financials, spreading gets done automatically and it goes off to credit. i know that there is software available that can read PDF's. Depends on, i think people like you and i in the environment that we are in, i don't know about you, from what i have seen is that you work the same thing that you worked
11. What can we do to bank the unbanked community like street vendors that Tyme bank is largely targeting	So, one of the things that we can do is and I believe some other banks are doing it to. So in the past if you wanted to accepts a credit card you had to have an account with the bank, you had to have a credit card machine and now they have those mini dongles which enable a lot more flexibility, you no longer need to have a business account, you can use the dongle from your personal account i think. our biggest challenge is probably going to be cell phone companies who are going to start moving into banking, supermarkets are moving into banking, that's both opportunities rather than challenges, sometimes rather than competing it's better to forge a relationship, i remember one of the branches we had, the local master currency travel services was extremely efficient, and they gave us a fantastic rate sort of like a foreign commission, and this particular branch couldn't really compete in the foreign exchange market with master currency travel branch right next door, so they paid us a referral commission , we found out that the commission received from the master currency travel services exceeded the revenue that we had earned on those transactions, processing them ourselves. So, we closed down the foreign exchange department it basically became a referral from a foreign currency perspective. i think we need to look at those kinds of opportunities rather than trying to tackle them head on. i am sure a lot of the supermarkets allow free withdrawals, from Checkers or Spar and i am sure they would be keen to get out of the banking market but still keep the transaction side of it as the bank would be to get into the banking market but not have the transactional side of it. and it would change quite considerably. We are certainly moving in that direction. We have changed the type of people that we used to employ; we are starting to pay more for the advanced skills than what we used to be. It's difficult to say without knowing what other banks are doing.

Interview Questions	Responses
12 Is there scope to collaborate with third party organisations to drive solutions delivery	I think very definitely, it would surprise me if our bank is not speaking to cell phone companies on exactly this, it would surprise me if we don't because the cell phone companies want to have that closer relationship with the client, they have all the front-end facilities to offer the customer this additional services to make a profit on it, but the banking on it, so for the cell phone companies it would make sense to outsource the banking part and for the cell phone company to remain the front-end and for the banks it would make business sense to do the opposite to reduce the bricks and motor to reduce the face to face interface. instead of this sort of vertical definition where you, so to compare i have just installed Linux on my home laptop, if you look at Linux there is a canal, there is an operating system wrapped around it, the operating system has the UI wrapped around it, the UI has a desktop wrapped around it, on Linux i can choose, i can say i want this canal with that distribution and that UI and some other desktop which is exactly what i have done, i am free to choose which components i want to interface, whereas if i am on Windows, i have got windows end-end and i think the Linux like model it's where we should be going, instead of seeing ourselves as one huge bank which you bank with FNB you bank with FNB end-end, rather split ourselves into components and say we might not want the customer interfacing directly with us as FNB, we might want the customer interfacing with us as MTN, we will use the components of us that work very well and whichever components are profitable and not have so many components that are not profitable . Rather like how the licencing department has decided their face to face, they have realized that they are good at keeping vehicle records and they are not good at interfacing with the public. So instead of them trying to fix their customer interface which would be expensive and probably not very effective, instead what they have done is that the Post Office has the customer interface, so why not plug into the post office which is what they have done, not the greatest example but it is far more pleasant as a somebody trying to renew their license, it's far more pleasant than having to go to the licencing office for me. and for the licencing department it's meant a substantial reduction in cost, for the post office it meant far better utilisation with the resources that they have, instead of the postal guys sitting there twiddling their thumbs, they now have work to keep them busy and we could do the same thing, we don't necessarily

	want to be FNB end-end, we might have relationships which components might be FNB
13.What are other mechanisms can the bank put forward to improve customer experience in ensuring that existing customers are preserved. (is there scope to implement Biometric Technology	Yeah I am sure, if the app stopped recognizing fingerprints I would stop using the app because it's one of the things I really like, think the security layer is much better than on internet banking with the username and password and I would probably move back to internet banking and say no i will cancel the app, i will use a username and password and you can send me the 2FA on ussd. we don't have enough of that , ideally for instance if you need multiple sureties signature from multiple people for a business lending, ideally each of the member should get a message on their phone to approve the suretyship using their fingerprint stamp and i know the risk guys were not too happy with that idea. they didn't think the courts would be happy with the fingerprint stamp with software records. One of the problems with risk is, there is two things to consider when you consider risk, there is a risk of doing what is proposed and there is also a risk of not doing what is not proposed and they tend to look at the risk of what is proposed and forget about the risk of not doing what is being proposed

Participant 7

Demographic Information

Participant	**Participant 7**
Current Role	**Application Developer**
Years of Experience	**11**
Area	**Commercial**

Project Background & Context

- Industry 4.0 in Banking

Critical Research Question

- How can Bank A's Commercial Segment bridge the digital divide brought by Digital banks, to ensure they remain competitive

Theory concepts to derive Interview questions.

Industry 4.0 in Banking – Digitization	
Interview Questions	**Responses and field notes**
1. How would you define the impact of industry 4.0 in the Banking sector in South Africa?	So I think we are still lagging behind in terms of automation of our processes, I know the guys in the field they need to collect information in a form of papers from clients and all sorts of things, something that we don't need. You can get the client to provide the client to provide this information without a bank employee going around and collecting this data and trying to explain some stuff, so in terms of automation, i think there is quite a lot of work that needs to be done.
2. Describe the customer expectation within the South African banking market in this digital era.	So, I mean this is a personal view. It would be convenient to have something like that, but you would want to live the control with the client for obvious reasons, let's say you don't have the funds in your account, you don't have the necessary approvals. the prompt is ok, but you wouldn't want it to be your main way of paying your debtors, you still want to that control to say i don't have money on the 25th, i can only pay on the 28th. so as much as we

	want to automate a lot of stuff, it's very much important to give the client control to run their finances. i am all for automation but there is a certain level that you need to hold on, you really can't go that way, you can't dictate to me how i run my finances.
3. What other factors slow the uptake of technology - does unemployment do?	again, I don't think so, but then again, it's not solely for FNB. FNB primary focus is to have efficient business processes that are efficient and generate profit. You need people to do that, but if you can get rid of other people whose jobs are redundant, it is what it is. It's unfortunate but it is what it is. so automating stuff will increase the unemployment rate, but as you say people can repurpose or re-scale to do something else, but it is the ultimate outcome of automation.
4. Do digital banks pose a threat to incumbent traditional banks in South Africa a. And what can we do to nullify that threat	At the current moment, I would say Tyme bank and FNB they don't play in the same market if I can put it like that. For FNB you are talking high value customers and FNB has the financial back and it has the products to be lending your R50 million, your R100 Million, of which the newcomers are not there yet. the newcomers cannot threaten your Big Five banks in terms of financial muscle in supporting the type of customer that FNB is supporting. So, no i think they are playing on a different field to FNB, so in terms of business banking i don't see a threat yet. Yes over time, this guy's once they grow and get the financial backing, i mean they getting 70000 customers a month, so those people will eventually evolve and once they are in that new bank they wouldn't want to move, but it's not something that will happen over the next year or two i suspect. yes, so I am in tech. I worked for Tyme bank. So, I can tell you the time to market a product while I was there it was really quick enabled by agile method. Someone will come up with an idea today and say look, let's do something like withdrawing money from an ATM.

New Core Banking Application

Interview Questions	Responses and field notes
5. Does the legacy core technology and architecture restrict the commercial segment from creating from realizing its goal 5.1 What can the bank do to remain competitive in this regard offer a personalized customer experience	yes, so I am in tech. I worked for Tyme bank. So, I can tell you the time to market a product while I was there it was really quick. Someone will come up with an idea today and say look, let's do something like withdrawing money from an ATM. That idea will go to production in a matter of 4 weeks, they have really quick turnarounds, because the stuff is new, and the tech is new so it's really quick to do whatever you want with it. Come to our case where we have been using the same banking system for the past 20 to 25 years. so, plugging in stuff in there is really not easy, you then get maintenance issues because there is a lot of plugs that you are putting in, something that it wasn't built for to start of with. So, in terms of time to market, in terms of pushing in new ideas, the new digital banks will give the big traditional banks a run for their money.
6. Describe whether there more opportunities or threats of enabling digital solution on the legacy architecture	I was reading an article this morning; it's called technical debt. Where you going to do something, and you would need to go back and fix it because it doesn't work for the strategy it's taking. We as FNB Commercial have a lot of technical debt, we rely heavily on this old core where you don't have the flexibility to change or add or removed things as and when you go. So is it a limitation, it is a very big one. So it will have to change eventually, if you look at where tech is going, you use a QR scanner to withdraw money from an ATM now, Can it be done, yes it can be done, but how long is it going to take you to do it, 4 months or 3 months. but the new guys can do it in two weeks
7. What should the bank do with it's legacy core banking application, should it keep it or decommission it	Yes, flexibility is required, you can still get flexibility now, except that it's more work, it's 5 times more work than the other guys, so you can still do it if you want to match the time to market, the amount of flexibility you have. you will eventually have to change you core banking system, but now how much effort is that. it's not something i see happening in the near future

Big Data Analytics	
Interview Questions	**Responses and field notes**
8. Describe how the bank can use data to	So, now that you are touching on data. We can still go back to the Tyme banks example. Where Tyme bank has a

develop contextual solutions	relationship with Pick n Pay. So Pick n Pay has your smart shopper cards and all sorts, all that data, your pick n pay, your boxer will have a specific data for Lebo, with your I.D number and we will know what you were buying, how you were buying and how you were paying for it, credit cards and what not. and using that data, we can pretty much tell that Lebo is this kind of guy and if you have proper analytics you can model a person and say this guy uses this, that and that and most probably he will need a credit card. So they even have a relationship with Experian, so they can go and get your credit details. So, going back to the conversation that we had about the big 3 offers, because now we don't give you a generic offer, there is a credit card, there is an overdraft. but now it's going to be specific to you. we have your bureau information, we know your spending habits and we know what kind of a person you are, this is what we can offer you, so it's going to be specific to you. So i am not sure how we use data at FNB commerical. So if we look at data in that way, to try and personalize our offering to the needs of the business.
9. Are there any restrictions that prevent the bank from using data effectively	Yes and No, so if for your POPI example, is it 5 years to keep information. 5 years is a very long time. Does it restrict what I did 5 years ago. it's really irrelevant to what I am doing now, so is it restrictive I don't think so, so you wouldn't need information that you had 5 years ago, you only need information from the last 12 months. people change and businesses evolve so you can't be using that old data, so i am saying it's not restrictive. So if you looking to build a 10 year record for this particular entity then yes, it's very restricting, because we can only get so much data

Industry 4.0 technologies	
Interview Questions	**Responses and field notes**
10. What Strategy or industry 4.0 technologies can the bank put in place to drive operational efficiency	that one is a bit of a difficult one, but I think there is always room for a AI, but the challenge is to find where it can fit. We've got the know-how but it's just a case of hey look do we actually need this part of the process. Which is where I think our challenge might come in. As a division we are kind of used to how things are working and why would you want to change it, it's working and we getting the numbers that we want, we set targets and we are hitting those targets. So, there is always a place for AI it's just to identify where it needs to be implemented.

11. What can we do to bank the unbanked community like street vendors that Tyme bank is largely targeting	yes, so I am in tech. I worked for Tyme bank. So, I can tell you the time to market a product while I was there it was really quick enabled by agile. Someone will come up with an idea today and say look, let's do something like withdrawing money from an ATM. That idea will go to production in a matter of 4 weeks, they have really quick turnarounds, because the stuff is new, and the tech is new so it's really quick to do whatever you want with it. Come to our case where we have been using the same banking system for the past 20 to 25 years. so, plugging in stuff in there is really not easy, you then get maintenance issues because there is a lot of plugs that you are putting in, something that it wasn't built for to start of with. So, in terms of time to market, in terms of pushing in new ideas, the new digital banks will give the big traditional banks a run for their money.

Interview Questions	**Responses**
12 Is there scope to collaborate with third party organisations to drive solutions delivery	For me the doing is not the problem, the problem is identifying what needs to be done, I think we have very capable people here, so implementing is not a problem. So those FINTECH that you talking about, maybe those are the guys that you need to bring in maybe not to implement but to bring in the vision, because we just need that one person whose going to see what we are not seeing and then it will come alive. for me that's the most difficult part because some of the people who have been in the bank for a very long time it's difficult to see otherwise because you are heading this system and the system is meeting it's target why change it. So someone else can come in and say you actually don't need this whole thing, go this route and that could be someone who as fresh ideas that we not going to get internally
3. We have a highly illiterate economy, can we enable biometric technology for example (voice authentication, to allow people to make payments.	I don’t think so, because yes, it’s convenient but it's a really small part to the bigger picture. Where I am a business and my relationship with FNB includes my credit card, it includes the overdraft for my business. So, to make a decision to say hey I need to leave FNB because i need to remember my password and username combination every time i log on to the app, for me that would be a non-issue. There is a whole lot going on that FNB that FNB gives you in terms of the facility that you want, so i think it would be a bit of a hustle to move that portfolio onto a new bank that is just going to allow the biometrics solution for me to

	easily access their platforms. So, it's convenient 100% but would it be something that would take me out of a relationship i have with a bank and i have settled there and i have all my products, i wouldn't. The value proposition you get at FNB supersedes all of those small conveniences.

Participant 8

Demographic Information

Participant	**Participant 8**
Current Role	**Product Manager**
Years of Experience	**10**
Area	**Commercial**

Project Background & Context

- Industry 4.0 in Banking

Critical Research Question

- How can Bank A's Commercial Segment bridge the digital divide brought by Digital banks, to ensure they remain competitive

Theory concepts to derive Interview questions.

Industry 4.0 in Banking – Digitization	
Interview Questions	**Responses and field notes**
1. How would you define the impact of industry 4.0 in the Banking sector in South Africa?	So, I think it's disruptive. We know that there is a lot of FINTECH's that are also up and coming, especially prior to the pandemic and the lockdown that has happened. We know that there is a lot of fallout also, and a lot of these upcoming FINTECH's have fallen away the likes of your Mercantile and Bank Zero which obviously delayed their deployment of their digital offering, it's disruptive like you say but it's also an opportunity for us to move away from the traditional banking. FNB will always be your partly traditional bank similar to your other big 4 banks, your ABSA, Standard Bank, Nedbank and Capitec obviously coming through in the retail space. But like i said it's important to embrace the technology and see how you can leverage of the new opportunities, the new platforms that we marked against i guess the smaller FINTECH'S and Digital banks are doing in that sense, So we know that the new generation or the millennials that mindset of banking is changing drastically, but we also need to be cognisant of our legacy systems and our legacy customer as well.

	you still going to have that old customer in preferring to talk to a relationship manager for that person to advise him on his banking, or the banking products and what to do in certain situations, so i guess it's a important to mould between the two where you have what we call at FNB your assisted and unassisted channels. So, your unassisted channels would be your bank 3.0 where you are looking at your app and online banking. and self-sustained customers don't need interaction, if there is interaction needed there is a BOT which is very minimal, but there is still a need for your assisted channels so your front-end your teliphany, sometimes you need that customer need to speak to someone on the other end. So that transition is much slower than some of the first world countries like Japan where it's almost fully digital and you don't need cards anymore and everything is run on We-Chats and thier payments systems are platforms. Whereas it's going to be a while for us to actually do that, it is however a journey, but like i said FNB is embracing that opportunity in moving over to your more unassisted channels, your app and your online banking.
2. Describe the customer expectation within the South African banking market in this digital era.	So we know from a retail side it's less complex, so when it comes to commercial customers you have big corporations you have multiple people working or that are mandated in terms of what they are allowed to do etc, So it's obviously going to be a journey in terms of implementation for them to do it on the digital platform. So obviously being in a commercial space it's obviously having the ability like you said initiate payments via a simple platform obviously being your online banking, online banking enterprise, simple app platforms where you could pretty much do everything that you could do in the past and more but being able to do it on your device. But the expectation is still to have that support structure through a relationship model which is fundamental to commercial banking in a sense that you need that person to leverage back on if you can't facilitate it on your own, So like simple banking and i think that's where some of the FINTECH or digital banks have seen the gap or even Bank Zero, is that you don't need a complex relationship structure with different value ads and value props solutions for customers, a simple growth customers' needs a simple bank account to receive payments, make payments and do cash withdrawals and if the need be able to use their physical or virtual cards that we have implemented now they have also see a gap in that

	sense, the expectation is for us to have that ability to have that banking zero sort of model obviously at a competitive pricing rate, obviously the other expectation is to give the customer further complex solutions or further dealings that is available for them as well. So as a bank we offer a whole lot of solutions and the expectation is for us to offer the same contextual solutions up until such a time where we can go fully digitized, but that's obviously going to be a journey and that will be quite a while since that happens.
3. What other factors slow the uptake of technology - does unemployment do?	We obviously need to migrate all of our core solutioning from the legacy platform and that's going to take a bit of time for us to actually do that, and obviously the capital outlay which we need to create a competitive architecture to sort of the likes of Tyme bank or Capitec. I think we still in a world where the t raxes of the landscape and the smaller digital banks are there and are relevant but we still the big boys and we control the market.
4. Do digital banks pose a threat to incumbent traditional banks in South Africa What can be done to curb that threat	I guess the more simple answer would be they provide more efficient platforms, more cost effective, like you mentioned we are still working off legacy systems, I mean we saw this coming 5 or 6 years ago, but the recent times have accelerated the need to move to this digitized sort of solutioning. We know that Capitec has become more dominant because they can offer cheaper solutions and cheaper products in a sense that they don't have the same problem that we have in terms of legacy and that's obviously replicated with your ABSA and Nedbank, i mean for example with Tyme bank that is just a counter of the number of accounts being opened i mean if you had to drill down to the active base. how many customers are actually utilising the product, yes, we can quote sales but you need to drill down to say what is the active usage of this particular products. So yeah great i mean some of us in the business segment have tasted the Tyme bank account opening process but none of us are actually using it, but i would say the one threat would be the pricing element, we obviously have thousands of stuff members, legacy platforms. We obviously need to migrate all of our core solutioning from and that's going to take a bit of time for use to actually do that, and obviously the capital outlay which we need to create a competitive architecture to sort of the likes of Tyme bank or Capitec. I think we still in a world where we the t raxes of the landscape and the smaller digital

	banks are there and are relevant but we still the big boys and we control the market.

New Core Banking Application	
Interview Questions	**Responses and field notes**
5. Does the legacy core technology and architecture restrict the commercial segment from creating from realizing its goal 5.1 What can the bank do to remain competitive in this regard	So look I think the enhancement of moving from the mainframe, So I think our mainframe will always be there and I think it's for us to find a better way to integrate to our mainframe, that allows us to expand from digital point of view or platform perspective, so i mean it's going to take time. So like i said our mainframe technology will be there for decades to come so it's always going to be the mainframe of how we develop our solutions from, but up until we get to a stage where and i think we are planning ahead to say our mainframe is a limitation for us but is there a different system that we can use that will effectively allow us to expand on it, because i mean as a simple example credit interest code or debit interest codes there are limitation in terms of how you would update that and that for me it's a no brainer, we should move away from that and become a bit more flexible, and i think they are looking to do that
6. Describe whether there more opportunities or threats of enabling digital solution on the legacy architecture	I am not really a systems architect, I can't really comment on what the fall out would be if we were to do something like that, but I mean I am sure we have put in processes and procedures in case something like that would happen and if we were to go down that journey of this digitization, we would have done some sort of risk based assessment to understand what is the systems capabilities in a sense that do you need to leverage of the third party's products to facilitate further solutioning for us or is it a case where we would need to build it inhouse. I think a lot of the solutions that we should go with are hybrid way in that in order to accelerate progression we leverage of existing vendors, there are times wherein we would need to purchase the vendor and they are time where we would need to build it inhouse and effectively perform that function that they perform for us. so to answer your question i think we would need to do enough due diligence and understand what our systems are capable of doing and if there are limitations to it, we would obviously solution or think

	about what is the best approach for us to facilitate this digital offerings.
7. What should the bank do with it's legacy core banking application, should it keep it or decommission it	So look I think the enhancement of moving from the mainframe, So I think our mainframe will always be there and I think it's for us to find a better way to integrate to our mainframe, that allows us to expand from digital point of view or platform perspective, so i mean it's going to take time. So like i said our mainframe technology will be there for decades to come so it's always going to be the mainframe of how we develop our solutions from, but up until we get to a stage where and i think we are planning ahead to say our mainframe is a limitation for us but is there a different system that we can use that will effectively allow us to expand on it, because i mean as a simple example credit interest code or debit interest codes there are limitation in terms of how you would update that and that for me it's a no brainer, we should move away from that and become a bit more flexible, and i think they are looking to do that

Big Data Analytics	
Interview Questions	**Responses**
8. Describe how the bank can use data to develop contextual solutions	So as a bank we offer a whole lot of solutions and the expectation is for us to offer the same contextual solutions up until such a time where we can go fully digitized, but that's obviously going to be a journey and that will be quite a while since that happens.
9. Are there any restrictions that prevent the bank from using data effectively	So like i said our mainframe technology will be there for decades to come so it's always going to be the mainframe of how we develop our solutions from, but up until we get to a stage where and i think we are planning ahead to say our mainframe is a limitation for us but is there a different system that we can use that will effectively allow us to expand on it, because i mean as a simple example credit interest code or debit interest codes there are limitation in terms of how you would update that and that for me it's a no brainer, we should move away from that and become a bit more flexible, and i think they are looking to do that

Industry 4.0 technologies	
Interview Questions	**Responses**
10. What Strategy or industry 4.0 technologies can the bank put in place to drive operational efficiency	So that transition is much slower than some of the first world countries like Japan where it's almost fully digital and you don't need cards anymore and everything is run on We-Chats and thier payments systems are platforms. Whereas it's going to be a while for us to actually do that, it is however a journey, but like i said FNB is embracing that opportunity in moving over to your more unassisted channels, your app and your online banking.
11. What can we do to bank the unbanked community like street vendors that Tyme bank is largely targeting	Yes or no, Simple banking is still prevalent especially with Capitec base growing so significantly. The customer just wants a simple solution, but in terms of your example that is what a simple consent/ debit order type of thing I mean the functionality does exist, i mean the confirmation. The more we enhance our platforms and capabilities, the more we can integrate further solutions and enhancements. compared to 3 or 4 years ago what we were able to do on Online and on the app is very much different to what we can do now.

Interview Questions	**Responses**
12. Is there scope to collaborate with third party organisations to drive solutions delivery	like i said it's important to embrace the technology and see how you can leverage of the new opportunities, the new platforms that we marked against i guess the smaller FINTECH'S and Digital banks are doing in that sense, So we know that the new generation or the millennials that mindset of banking is changing drastically, but we also need to be cognisant of our legacy systems and our legacy customer as well.
13.What are other mechanisms can the bank put forward to improve customer experience in ensuring that existing customers are preserved. (is there scope to implement Biometric Technology	So obviously the whole t-rax like I mentioned, we are the big boys. So, it's a bit difficult for your FINTECS or Digital banks to branch out to communities and society and say you can trust us. We know that a lot of people are finicky about their money and with the different fishing scams that are going on, they know that your top 5 banks are your trustworthy banks, i mean if you look at the likes of African bank, yes they offer the highest fixed rates in the market but customers know that they can't really trust them with their money. So we need to continue relaying that message to say we are evolving as a bank to cater for the nuances the niches, and i guess the new needs of society or our clients, but it's going to be very difficult for some of the FINTECH to grab our market share, it's not going to happen overnight and it won't happen for a few years, but that's where the opportunity lies with us to say

	you bank with us and we are a trustworthy institution and we are delivering on solutions that are really competitive to the likes of your smaller disrupters. I mean if you look at the likes of Capitec in the beginning, their general market share was obviously at an entry point, but in terms of the retail side they are now comparable to Nedbank. Obviously over time Capitec has really appealed to the lower end of the market and the lower end of the customers and around the youth as well , seeing in terms of what they were able to offer in terms of cost effectiveness, your cheaper monthly fees etc. We know that 5 to 6 years a lot can change and that's why FNB is always on that journey in order to facilitate what's required by customers. as of today we call it attrition so customers effectively leaving us for other institution or not being main banked by us, so that's a constant threat as well, but it's just about reassuring that despite us being a little bit expensive we are kind of worth in a sense that the value proposition that you get with us holistically as a bank is better of than for example a free monthly account fee at bank zero or your tyme banks solution. We encompass your insurance products, your QR Codes to merchant services, you connect device

Appendix E

Data analytics and Coding

Analytics One

First level Coding directly from raw data									
Industry 4.0		**Respondent 1**	**Respondent 2**	**Respondent 3**	**Respondent 4**	**Respondent 5**	**Respondent 6**	**Respondent 7**	**Respondent 8**
1.How would you define the technological advancement brought introduced by the 4th industrial revolution at Bank A		Not taken full advantage of this revolution Slow uptake of technology due to legacy architecture.	Due to Digitalization Banks have evolved.	Technology has helped with query resolution Digitization has helped quicker turnaround times	The use of appealing technological/digital advancement to attract low income individuals. Product Offering on the Digital Platform to increase faster take up	New Core Technology Architecture supports new technology is all about Embracing new technology however can't compete with digital banks because of the legacy tech Easy customer offering on the new technology stack	Industry 4.0 will bring a lot of changes at the bank	Still lagging in terms of utilizing the industry 4.0 technologies	Industry 4.0 has been disruptive Industry 4.0 provides Bank A the opportunity to move away from traditional banking

2.Describe the customer expectation within the South African banking market in this digital era.		Zero Monthly account fee contextual solutions Transact with minimal fee	Educated about digital offerings Automated Payment Services customised solutions	easy to use digital platforms SME – using the unassisted platform Corporates – prefer having a relationship model	Easy access on the digital platforms Education about our digital offerings	Different customer needs to be catered to offer customer specific solution	Self-service channels and automated decisions	Automated payment systems with a bit of control	Expectation is a simple payment system/ process-pay using a phone number instead of the account Have a support structure through a banker relationship model Offer Contextual Solutions Provide a competitive pricing model with the Bank Zero Model

3.What other factors slow the uptake of technology - does unemployment do?		Not taking jobs, changing the way people work. Need to continue implementing AI solutions to improve customer decisioning Tech is taking over therefore people should upskill themselves	Automation creates opportunities, unemployment not the reason for slow uptake of technology	Unemployment is not a concern/reason why technological uptake is slow	Ensuring Technological adoption and usage	Old Legacy Core is restrictive and not the unemployment Unemployment not the reason for slow uptake of technological advancements Aggressively employ A.I to increase profit	Aim is to reduce the operational costs	The Bank's focus is to create efficient business processes that generate profit.	Migrate the core solutions into the new platform Creation of a competitive Architecture

4.Do digital banks pose a threat on traditional banks **4.1What should the bank do to curb the threat in terms of strategy and technology**		Digital Banks are a threat in the SME space Smart Modelling to understand customer needs Free access to our banking platforms – App and Online Multilingual AI technology for customer attraction	Yes and No – bigger threat to the retail segment, which over time might be a threat in the commercial segment Need to attract younger customers to whom technology really appeals for customer attraction	It might be a threat, but there are other things to consider like the retention period of the accounts opened Separate Marketing Strategy to keep up with the uptake of these clients	Digital banks pose a bit of threat to the SME customers- side hustle customer Need to look to solve and nullify the threat for the entire continuum of our customers	They are small players however, threat is there right at the bottom end of our customers Sell lower end customers simple products Cheaper banks accounts and easy to use still using Waterfall method to deliver solutions therefore the bank needs to Improve project delivery methodologies.	Digital Banks are a threat to the entire continuum of our customers	Not a threat for now, however might be in the future once they get the financial backing	Yes, they work of efficient platforms which is more cost effective Provide cheaper solutions at an affordable price

Analysis – Categories for Analytics One

Question 1 (Second Level Coding develop Categories)

Respondent 1,3 and 8 say that industry 4.0 provides an opportunity for the bank to invest in the new core banking application to easily integrate with digital solution.

Respondents 2, 3,4,5 and 7 agree that industry 4.0 has changed and revolutionized banking, with digitization and automation being the core at improving customer experience

Respondent 1,6,7 agree the bank has not taken full advantage of industry 4.0 technologies, with respondent 8 sharing the same sentiments in that industry 4.0 has been disruptive to traditional banking models

Question 2 (Second Level Coding to Develop Categories)

Responded 1, 2, 5 and 8. agree that one of the things that the bank should be focusing on from customer expectation point of view is offering them contextual solutions by doing rigorous needs analysis across all the sectors of their customer base, from Small Medium and Enterprises, Business Customers and through to Commercial customers the bank will discover that each customer is unique and they have different needs at different times of their lifecycle

Respondent 1 and 8 agree with each other in terms of the customer expectation, customers in this new digital age expect to transact without paying monthly account fees to less or very minimal transaction fees. Respondent 8 argues that the customer expects a bank zero model at a competitive pricing model.

Respondent 2 and 4, agree that the bank don't offer customer specific solutions based on their needs, we just offer generic solutions on the digital platform for everyone without even informing our customers, an example is there is a debit order reversal functionality on the app, however there are customers who are not aware of that solution and hence the one way to solve any debit order disputes is either by going to the branch facilities or though telephonic conversation with the bankers So the suggestion from the two respondents is to inform and educate people about functionality that is provided on our digital platforms .

Respondent 2, 6 and 8, have the same view regarding customers having the expectation of automated payment services, especially when the customer is paying the same suppliers/debtors, it is cumbersome to go onto a digital platform insert the account number and payment references every single time when making payments.

Respondent 3 and 6 agree that there are customers who expect to have the relationship model in terms of support with their transactional, lending, and general inquires needs

Respondent 3 and 4, state that customers expect to easy to use and accessible digital platform, respondent 3 argues that once customer find it difficult to use the digital channels they tend to use branches and call centre to assist with their needs. customers using branches becomes an expensive model for the bank.

Question 3 (Second Level Coding to Develop Categories)

Respondent 1, 2, 3, 5, 6, 8. All agree that the slow uptake of technology is not as a result of the fear of retrenching people or the general unemployment rate that the country is facing, respondent 5 and 8 further argued that old legacy architecture is the reason why the bank is slow in embracing some of the advancements that this revolution brings and the bank should try every effort to create a competitive architecture in so that it doesn't lose customers

Respondent 1,4,5,6, 7 and 8. share the same sentiments; in that the bank needs to continue with implementing technological advancements to reduce operational costs, drive operational agility to increase profit for the business irrespective of the unemployment consideration. the respondents argue that after the implementation of technology people can always be repurposed to other roles that align to technological advancement introduced by industry 4.0

Question 4

Respondent 1, 3, 4, 5 6 and 8. Agree that digital banks pose a threat to the bank's commercial customers and to further drill it down, respondent 1, 4 and 5 argued that they pose a bigger threat in the Small Medium and Enterprise customers, which are customers with a turnover of 0 - 5 million (Ref FNB) in that these digital banks are targeting these set of customers by offering low cost banking products that are appealing and easy to use. Respondent 6 and 8 however agreed that these digital banks pose a threat to the entire continuum of the Banks Customers, with Respondent 3 arguing that they might be posing a threat however there are other things to consider, like the retention period of businesses opening up business accounts with these new entrants

Respondent 2, 7 both agree that they don't pose a threat in the business/commercial space, with respondent 1 mentioning that that pose a bigger threat in the consumer/retail space as it easy open up a bank account and very rarely use it with different banks. Respondent 7 argues that most of these new entrants do not have the complex lending products and the financial backing to lend business customers and hence the Bank is still relatively protected in the business/commercial space however they might pose a threat in the future not now

Respondent 1 and 4 agree that the bank needs to solve for the entire continuum of the Bank's customers by looking into Smart Modelling to understand what their need are

Question 4.1

Respondent 1,2 and 3 argue that the bank needs to look the strategies of appealing to customers, with respondent 1 arguing that Multilingual AI solution should be used to attract entities/people whom English is not their first language. Respondent 2 argues that the Bank needs to target younger people so that when one day they decide to start their own business it would be a lot easier to keep them into the ecosystem because they are already existing customers.

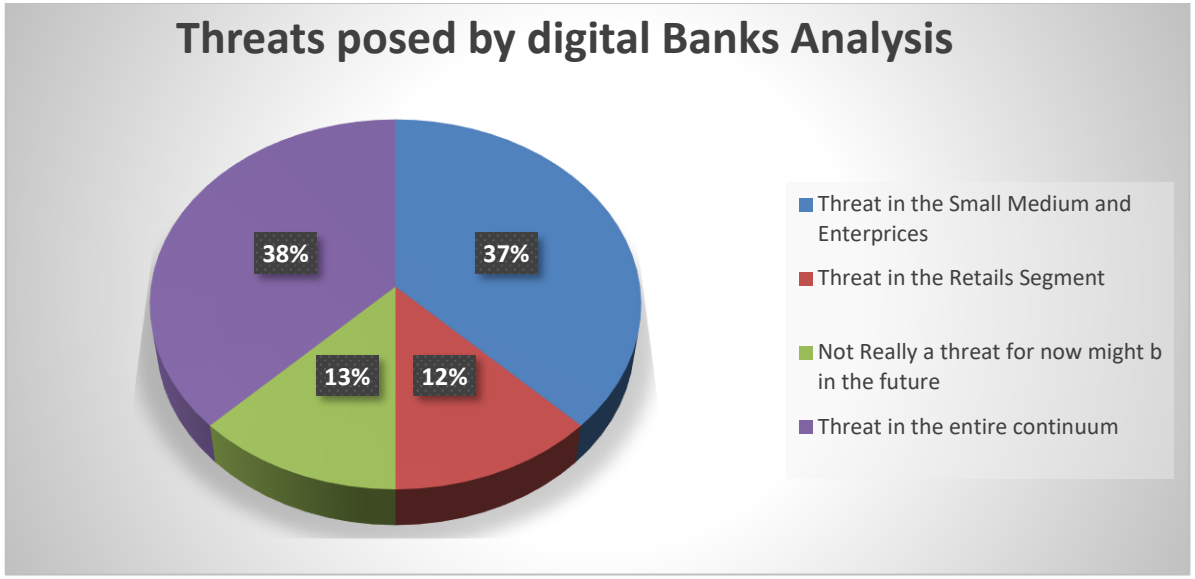
Respondent 1 says that the bank's digital platforms should be free to access so that customers can access it without the hustle of buying data

Respondent 5 and 8 argue that the bank should offer simple, cheap solutions to customers

To drive quicker solution delivery, respondent 5 and 7 say the bank should move from the waterfall project delivery method to an agile project delivery method, which would allow the bank to deploy software solutions quicker, so that customers can get value sooner rather than later. Respondent 5 further states that for the bank to be competitive it must capture the market before there's any competition.

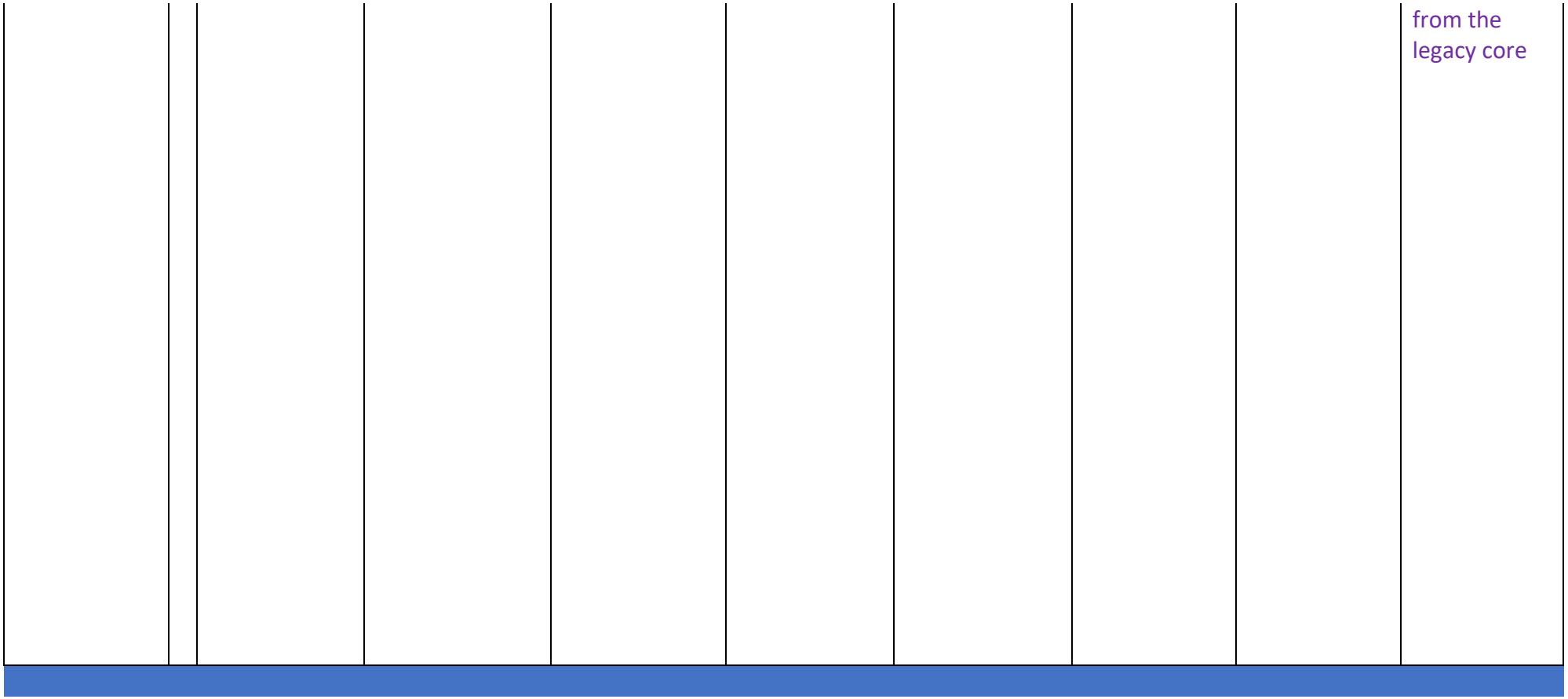
Graphs for Analytics One

Threat in the Small Medium and Enterprises	Threat in the Retails Segment	Not Really a threat for now might b in the future	Threat in the entire continuum
3	1	1	3
37.5%	12.5%	12.5%	37.5%



Analytics Two

First level coding									
		Respondent 1	**Respondent 2**	**Respondent 3**	**Respondent 4**	**Respondent 5**	**Respondent 6**	**Respondent 7**	**Respondent 8**
5.Does the legacy core technology and architecture restrict the commercial segment in any way		Legacy core technology is s restriction, it doesn't offer the customer anything more than an account.	Legacy Core system and business processing a limitation for use to play in the same field as digital banks in terms of product development and marketing	Legacy Core system not a restriction because it has processing power and speed	Our legacy Core Solution is built with processing power therefore not a restriction	Legacy Core Technology was not built for digital interface which makes it difficult to integrate the two. Legacy technology is expensive to maintain	Can meet customer needs because you have existing infrastructure that you leverage of. Integrating Legacy Technology to current technology is costly	Legacy Core restricts the bank from implementing solutions quickly Plugging in digital solution on the old technology is not easy and is associated with maintenance costs	Lesser flexibility on the Legacy Core, we should move away from it however it will take some time
5.1What is it that we can do to remain competitive		Using Two Platforms – Legacy and Cloud enabled core	Migrate to the new technology stack, because it enables quicker solution delivery	Interface Legacy Core with the latest technological advancement	Seamless integration between legacy system and our digital platforms				Need to find better ways to integrate the digital platform, because it will take time for us to move away


from the
legacy core

6.Are there more opportunities or threats of enabling digital solution on the legacy architecture		Threat, because it stops us from selling our basic products and it stops us from creating new products	There are threats, however implementation based on the situation might be needed.	Interface the processing power of the legacy mainframe with the digital solutions	More opportunities of enabling our digital offering on a legacy core	Take the good of the legacy architecture and implement the new on top of it	Threat enabling digital solutions on the legacy architecture, there are new opportunities for businesses that do not have the legacy core systems	Enabling digital solution on the old legacy system is associated has technical debt Legacy Core limits flexibility of implementing solutions New Tech – Using QR scanner to withdraw money – Would take a digital banks two weeks to implement and it would take traditional banks 4 months to implement	Risked based approach enabled digital solutions on the legacy architecture

7 What should the bank do with it's legacy core banking application, should it keep it or decommission it		Using two Core Solutions; one that allows the bank the flexibility required in the digital age and keep the legacy core to cater for simple needs	Two Core Systems – Parallel Approach, however, decommission the legacy system over time	No, need to use the processing power of legacy system	Use parallel approach, cloud enabled core solution and current traditional core system	Use components of the old and implement it on top of the new technology stack	Retain the legacy core system as a transaction database and use the new technology stack.	less flexibility with the legacy core solution, change the core solution into the new technology stack	Move away from the legacy sore to be more flexible

Analysis – Categories for Analytics Two

Question 5: **(Second Level Coding to Develop Categories)**

Respondent 1, 2, 5, 7 and 8. agree that the legacy core technology is a restriction in the commercial segment, the restrictions range from inflexibility to drive quicker solution delivery to having challenges in terms of integrating it to the digital platforms, With respondent 5 indicating that when the mainframe technology was bought there was never thought of it interfacing with the digital channels, because it never existed. Additionally, Respondent 5, 6 and 7 agree that legacy systems are expensive to maintain, although respondent 6 states that you might be able to meet customer needs with the legacy core system, however it's an expensive system to maintain

Respondent 3, 4 and 6. argue that legacy core systems is not a restriction because of the processing power and speed with which it is associated with. With Respondent 6 further arguing that it might be easier to give customers what they want because you have existing infrastructure that you are leveraging of

Respondent 3 and 5 argue that to compete with the digital banks, the bank needs to find an optimal way of interfacing legacy core system to our digital platforms and also to the latest technological advancements available

Question 6:

Respondent 1,2,6 and 7 which is 50% of the participants agree that there are threats of enabling digital solutions on the current legacy architecture, with respondent 7 putting emphasis on the technical debt the bank has as a result of interfacing digital solutions on the legacy core banking application. Respondent 6 states that legacy core limits the flexibility of quicker solutions delivery. Enabling something like a QR scanner to withdraw money would take about 3 months for the bank to implement it, however it would take a digital bank that is on the new core banking application would take a couple of weeks to implement the such a technology.

Respondent 3 and 4, which is 25% of the respondents argue that there are opportunities of interfacing digital solutions on the current core banking application, with respondent 1 saying the bank should use the best of both worlds, i.e. processing power and capability of the mainframe core system and interface that with the new type of technology which is app, online, Java type of application. Respondent 4 saying interfacing digital platforms to the mainframe technology is not a threat, because no one has ever said the legacy sore is unstable.

Respondent 5 and 8 which is 25% of the participants state that although we may need to decommission the legacy system, however it may take long to actually decommission the legacy systems, however in the interim the bank can take certain components of the mainframe that works well and interface it with digital platform, then maybe that that would be an opportunity for the bank.

Question 7 **(Second Level Coding to Develop Categories)**

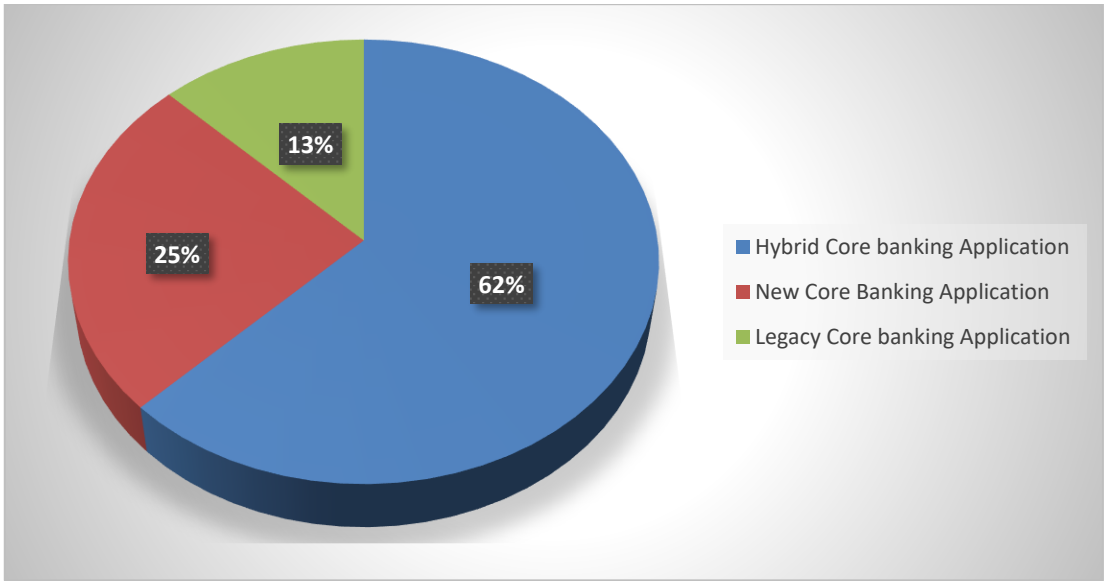
Respondent 1,2,4,5 and 6 agree that the banks should be looking at implementing a parallel type of approach by implementing 2 banking core systems. i.e. new core banking which provides the flexibility required in the digital age to cater for customers with simple needs like the SME customers of which digital banks pose the most threat, and continue using the legacy core system to cater for complex needs. Responded 5, argues the bank has to move to the new technology stack, however it should also use some of the good components from the legacy core and build it onto of the new technology stack. Respondent 1 and 4 states implementing cloud enabled core banking application to cater for the low profit customers, to allow them the flexibility of not paying heavy monthly account and service fees which currently customers are paying as a result of the maintenance cost associated with the legacy core system which is ultimately pushed to the customers.

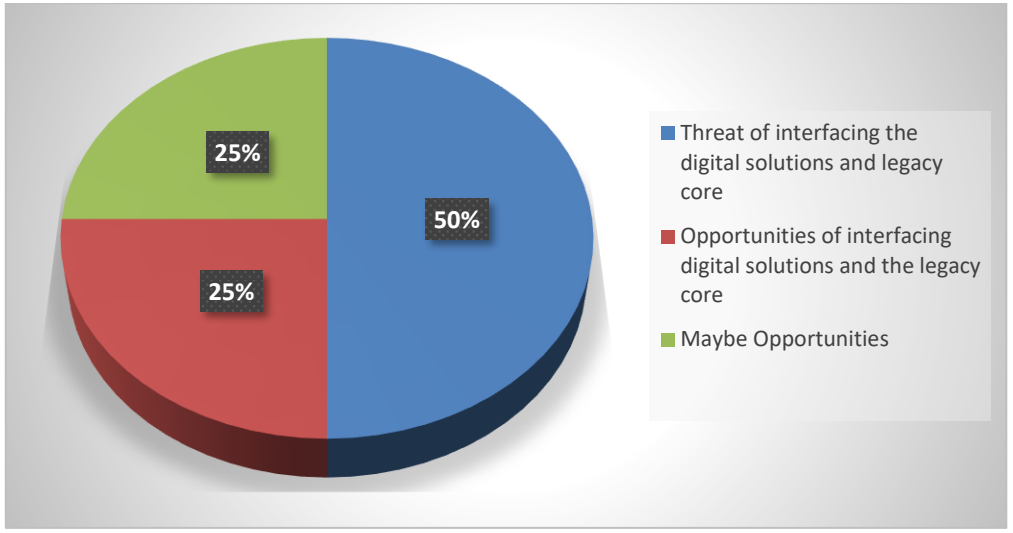
Respondent 3 argues that the bank has to keep the legacy core system as a result of the processing power and capability that it provides, the bank can interface the legacy core with external systems using the API solutions and also the digital channels.

Responded 7 and 8 agree the bank should move away from the legacy core banking application into new core banking application to provide the bank with the flexibility required to compete with the digital banks. Respondent 5 shares the sentiments, however the respondent argues, the legacy core will still be with the bank for the next ten years, what the bank could do in the interim to ensure they maintain their competitive nature, so to take some of the good components from the legacy system that are critical and build it top of the new core banking application.

Graphs for Analytics two

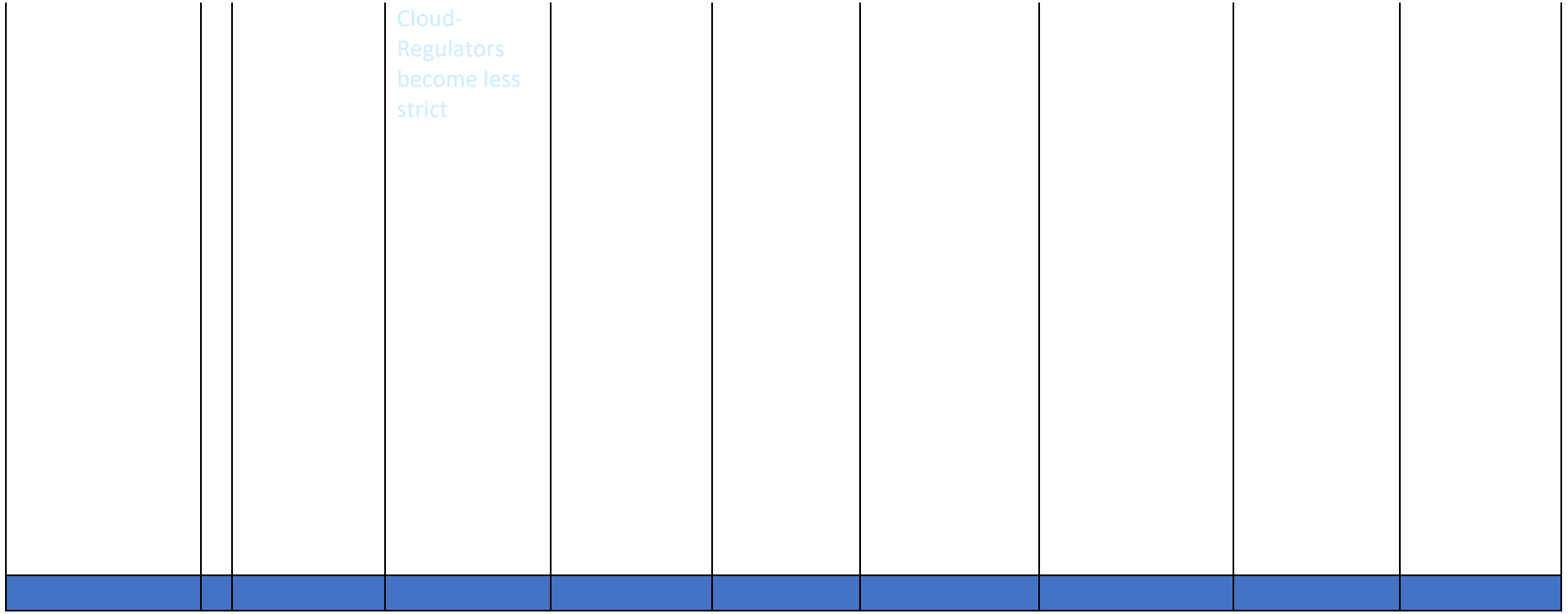
Hybrid Core banking Application	New Core Banking Application	Legacy Core banking Application
5	2	1
62.5%	25%	12.5%




25%
50%
25%
Threat of interfacing the digital solutions and legacy core
Opportunities of interfacing digital solutions and the legacy core
Maybe Opportunities

Analytics three:

First level coding									
		Respondent 1	**Respondent 2**	**Respondent 3**	**Respondent 4**	**Respondent 5**	**Respondent 6**	**Respondent 7**	**Respondent 8**
8. Describe how the bank can use data to develop contextual solutions		Data Analysis to make Realtime decision on a customer Customer Trend Analysis Modelling to understand customer needs	Using Data to automate payment services – Customer Experience Using data to build future product offering Using Data to enhance digital platforms- Customer Experience Public Cloud services for our data storage – Cost Saving Migration of Non-Critical Data onto	Need to enhance our data models for future product offering	Data Analytics to provide contextual solutions	Need to reduce overheads by reducing the channels with which we offer our products Using propensity Models to determine when a customer needs credit solution and the timing	Build a model that will understand customer needs Implement Common data standards Build a multi-tenanted data warehouse Allow information flow via the interconnectivity of databases	Partner with supermarkets to understand the spending behaviour to ultimately offer customer specific solution	Use the data to offer contextual solutions


Cloud-
Regulators
become less
strict

9. Are there any restrictions that prevent the bank from using data effectively		Disparate Data because of our data architecture Lack of Skills to fix out data architecture	Not being on Cloud Restricts the ability to integrate with FINTECH's Not allowed to host data outside South Africa- Regulatory Restriction Engage with the regulator for cloud data storage- Cost savings for us	Legislative restriction in terms of Data usage	Regulatory Restriction – POPI Marketing and Processing Consent Global Regulatory restriction (GDPR)	Data not being in a single reservoir The naming standards of the fields has to be standardised	Regulatory restrictions POPI Lack of Information flow Data can't be looked at in the same query	Regulatory restriction – POPI in terms of data	As a result of the mainframe technology, data architecture becomes a limitation

Analysis – Categories for Analytics Three

Question 8 **(Second Level Coding to Develop Categories)**

Respondent 1, 5 and 6 say the bank should invest resources to better understand customer needs, respondent 1 argues the bank's data is disparate which prevents it from making real time decisions on the customer. Respondent 5 indicates that the bank had already started working on some of the propensity models to determine when a customer needs a credit product, the respondent argues the bank should accelerate the implementation of this model. Respondent 6 says customers generally don't know what they want, it is therefore the responsibility of the bank to build models that can match what the customer need to what the bank can offer.
Respondent 4, 7 and 8 indicate that based on the models created to understand each business need, the bank can start offering contextual solutions which specific to each business or individual. Currently the bank offers products that the customer qualifies for irrespective of whether you need a product or not, the bank would pre-score qualifying customers, the scoring component involves calling credit bureau for ITC checks. Respondent 8 argues, the bank can partner up with supermarkets to understand customers transactional behaviour which would ultimately offer customer specific solutions.

Respondent 2 and 3, state that the bank should be start using predictive analysis for future product offering.

Respondent 2 and 5 agree that the bank should use data to enhance the digital platforms based on the interactions that the customers have with the different channels the bank has i.e. Branches, Call Centre and digital platforms. Respondent 2 argues payment services should be enhanced as a general user experience wherein if for example a customer is paying a certain supplier every month on the 25th, instead of making the customer go through the payment process, it would be beneficial if a function like that is automated. Respondent 5, says the bank has large overheads because it has all its products out there on multiple channels, including branches. It is therefore important to do an analysis on the products it offers on which channels those products are offered and the target customers. The bank should do enhancements on its digital platforms to ensure it easy for customers to use and customers adopt the use of digital channels more than they visit branches, particularly the low profit customers (SME's).

Respondent 2 and 4, agree the bank should provide educational programmes to empower its customers about the digital offering. Respondent 2 argues, often it's not a matter of customers being reluctant to use the digital channels and the functionality that the bank provides, it is however lack of knowledge that customers have.

Question 9 **(Second Level Coding to Develop Categories)**

Respondent 3, 4, 6,7 agree that from a regulatory point of view, the POPI act (Protection of Personal Information) which puts a limitation for the bank to only process relevant data with a specific purpose, additionally it also the act states that personal information to be processed may only be collected directly from the data subject. Respondent 4 further argues that there is global regulatory restriction (GDPR) for customers who are United Kingdom(UK) or have any UK type of relation which is the same as the POPI act in terms of restricting the bank from processing personal information.

Respondent 2, states regulators prevent the bank from hosting data outside South Africa, which is a disadvantage because most of the cloud storage providers are not in South Africa yet.

Analytics Four

Firs Level Coding									
		Respondent 1	**Respondent 2**	**Respondent 3**	**Respondent 4**	**Respondent 5**	**Respondent 6**	**Respondent 7**	**Respondent 8**
10. What Strategy or industry 4.0 technologies can the bank put in place to drive operational efficiency		Implement the right data infrastructure, to implement machine learning and deep learning. Implement AI models to automate business processes and prevent data quality issues We need to Enable a biometrics payment technology onto our core	Automated Payment Services to enhance customer experience The use of Blockchain technology	AI technology to streamline the business process. AI to decrease the interaction and time it takes for customers to open a bank account The use of API Solution for Integration purposes	Automating information flow Automation where there is a constant pattern (RPA) Automation in terms of the 80% to 20% principle Enable API solutions to move away from business function to integrate with external systems	Use AI to reduce workload Automated credit decision feed people to focus on innovative projects especially the judgemental credit decisioning process	Automate Cut out the cost of a middleman Optical Character Recognition (OCR) technology to automate capturing of customer financial statements for quicker credit decision making	There is always room for AI, need to find repetitive processes to automate using RPA	Implementation of a AI – We Chats for query resolution, instead of a human interaction through a branch or call centre.

11. What can we do to bank the unbanked community like street vendors that Tyme bank is largely targeting		Implementation of a Wallet System instead of a bank account to attract the unseen economy AI – Chatbots that are Multilingual	Using programmes to educate customers about the Banks product offering	AI to attract the unseen economy	Financial inclusion strategy for the unseen economy	Lower profitable customers should be catered on the digital platform – Strategy Buy a separate brand to cater for lower profit customers and migrate those customers once their businesses start growing	Forge a relationship with Cell phone companies and supermarkets so that supermarkets can focus on the customer attraction and the transactional side and the Bank focusses on the banking component	Quicker marketing turnaround times – Implement simple product for the unbanked and market it quickly	Providing simple solutions for customers To grow the customer base

Is there scope to collaborate with third paty organisations to drive solutions delivery		There is definitely a need Buy Solutions and do minimal customisation	There is scope to utilize FINTECH's – MoneyGram to do Cross Boarder Payments	Should use FINTECH's to help with Solution Development	A need to integrate FINTECH's, however it has to be solutions that reaches the market and is beneficial	FINTECH's don't understand your existing technology architecture. FINTECH that's going to build the whole core solutions then maybe yes FINECH's develop solutions so that Banks can buy them	Need to speak to Cell Phone Companies Outsource the face to face interaction to cell phone companies and keep the banking component	FINTECH's should be brought into the ecosystem to identify what needs to be changed and implemented	Leverage new opportunities that FINTECH's provide

What are other mechanisms can the bank put forward to improve customer experience in ensuring that existing customers are preserved. (is there scope to implement Biometric Technology)		Biometric payment solutions to help the highly illiterate economy	Educational Programmes	Use of Biometric Technology to easily access our platforms remove the need to remember password and username combination when logging onto the digital platform	Use every technology at your disposal to help customers	Enforce the Use of Cell Phone Banking as payment solution like Kenya did Look into the strategy of buying FINTECH's once they have an established customer base	Ease of access using biometric technology Allow Customers to approve Suretyship using a biometric fingerprint stamp	Continue providing and improving the value proposition	Customer Reassurance about the value proposition More customer education more than technology

Analysis – Categories for Analytics Four

Question 10**(Second Level Coding to Develop Categories)**

Respondent 1, 3, 4, 5, 6 and 7 agree that the bank should invest in the AI technology to remove some of the manual and labour-intensive processes that the bank has. Respondent 1, 4 and 7 further state the bank should invest in Robotics Process Automation (RPA) to optimise repetitive processes, in addition responded 5 argues that the bank should automate most of its judgemental credit decisions that are taken by a credit committee by building appropriate scorecards, this will reduce the bank's operational costs. Respondent 6 states that the bank should be looking into cutting out the middleman by implementing the Optical Character Recognition (OCR Technology) to automate the need of an analyst of an analyst capturing financial statements, which will effectively improve data quality and allow quicker credit decisions.

According to respondents 3, 5 and 8, operating a branch facility is associated with large operational costs, which is paying for, rentals, water, electricity, staff salaries etc. The three respondents agree that the bank must reduce the operational costs by reducing the number of branch/call centre interaction through the implementing AI technology that can assist customers with profile and account opening process with minimal human intervention. Respondent 8 further states that We Chat messaging should be implemented to support any query resolutions that customer have regarding their accounts. The respondent argues this will effectively lessen the number of people who make use of call centre and branch facilities to solve their queries.

Respondent 2 states that in order to improve customer experience, the bank should implement automated payment services particularly for business customers who generally pay the same supplier on a monthly basis.

Respondents 1 and 2, state that to date the bank has no functionality that talks to how we deal with blockchain technology because of the legacy core banking system which is too old. With respondent 1 saying the bank should be implementing blockchain to improve its software infrastructure security from hackers, which would prevent hackers from accessing transactional data or divert transaction information, additionally the technology would help the bank to protect customer personal information from hackers. Respondent 2 says the technology should implement blockchain technology much like how smaller banks do to facilitate cross boarder payments and remove the need to have a third party bank to facilitate and settle our payments which charges the bank a substantial amount of money

Respondents 3, 4 states that although legacy core systems are not a restriction for the bank, it is however important that the bank moves away from the business functions, which are interface layers that are currently used to integrate the legacy core to other internal systems within the bank, to a more current solution which is the API solution. The API solutions provides flexibility in allowing the core system to integrate with other external systems to the bank, which effectively allows for efficient and seamless information flow.

Question 11 **(Second Level Coding to Develop Categories)**

Respondent 1 and 2 argue that the bank should invest in the AI technology to attract the unbanked community, with respondent 1 further stating, a multi-lingual technological tool should be used to engage with unbanked communities, particularly the street vendors who might not understand English, having a tool that converses in the language of their choice would be a sign of inclusivity and that the bank can be trusted

Respondent 4, says instead of investing in technology to attract the unbanked community, it should rathe use a financial inclusion strategy to attract these customers

Respondent 5 and 6, state that the bank should keep should split its brand, respondent 5 argues the bank should have a separate brand to cater for the needs of low profit customers and once their business brands grows they can be migrated onto BANK A's commercial segment for the more complex product offering. Respondent 1 shares similar sentiments in that, the bank should forge a relationship with cell phone companies/supermarkets so that the bank can outsource the customer interface component to them, from a customer attraction, customer onboarding and the transactional side of things. The bank can then focus on the banking component. this model would reduce the need for customers walking into branch facilities or calling the call centre to inquire about the bank's product offering which will ultimately reduce the operational costs

Respondent 5 says low profit customer should only be catered for on the bank's digital platfom, to avoid the need of them going to the branch or using the call centre facilities

Respondent 2 says the bank should have programmes to educate the unbanked community about its product offering and the value proposition in terms of helping smaller business to grow wherein the bank provides a financial
coach.

Question 12 **Second Level Coding to Develop Categories)**

Respondent 1, 2, 3, 4, 6, 7 and 8 agree there is scope to integrate with FINTECH companies in South Africa to drive solution delivery and leverage new opportunities that FINTECH's provide. Respondent 6 putting emphasis on the need to collaborate with cell phone companies, the respondent says rather than competing with these cell phone companies who are creating payment systems like M-Pesa which makes it easier for the customer to live without a bank account because the mobile phone provides money transfer services, payments and micro-financing services. The bank would rather split itself into two components, and say the bank may not want the customer interfacing with the bank directly because that is an expensive model in terms of setting up branch facilities and call centres, it would be best for the customer to interface with a cell phone company and the cell phone company would interface with the bank for the banking component which is the infrastructure that enables the pillars of banking i.e. transact, insure, invest, and credit provision.

Respondent 5. Says bringing in fintech companies to drive solution delivery is not worth it because they don't know how the current architecture works. The respondent further argues if the fintech is going to build a brand-new core banking application on a new architecture then maybe yes, the might a scope to bring them into the bank's ecosystem.

Respondent 1 says the bank can explore the possibility of acquiring the whole fintech company to incorporate their solutions and human capital into the bank's operation. Although respondent 5 doesn't see the need to integrate with FINTECH companies at this stage, however the respondent argues that these fintech's exist because they want large traditional banks to buy them, he states their primary interest is not to own a business, however to provide solutions to a specific segment of the market. Once they are established and have a customer base, they would then sell the business to traditional banks.

Question 13 **Second Level Coding to Develop Categories)**

Respondent 1,3 and 6 argue that biometric technology is a critical tool in terms of improving the current customers experience, with respondent 1 stating that for a highly illiterate economy like South Africa's one where people can't read, the bank should invest in mobile payment solutions like Alipay which will allow customers to pay with their face, which is a better user experience than having to navigate through the banking app and reading instructions that they potentially won't understand. Respondent 3 and 6 agree that the bank should continue improving it's biometric technology to allow ease of access onto the bank's digital channels, with respondent 6 further stating to help improve the experience of customers signing suretyship on behalf of other legal entities, the bank should implement biometric technology to allow customers to sign suretyship with thier fingerprint stamp, instead of send documents for a wet ink signature, which has an effect of delaying loan payments. Respondent 4, says the bank should be investing in any type of technology, as long as it meets customer expectation

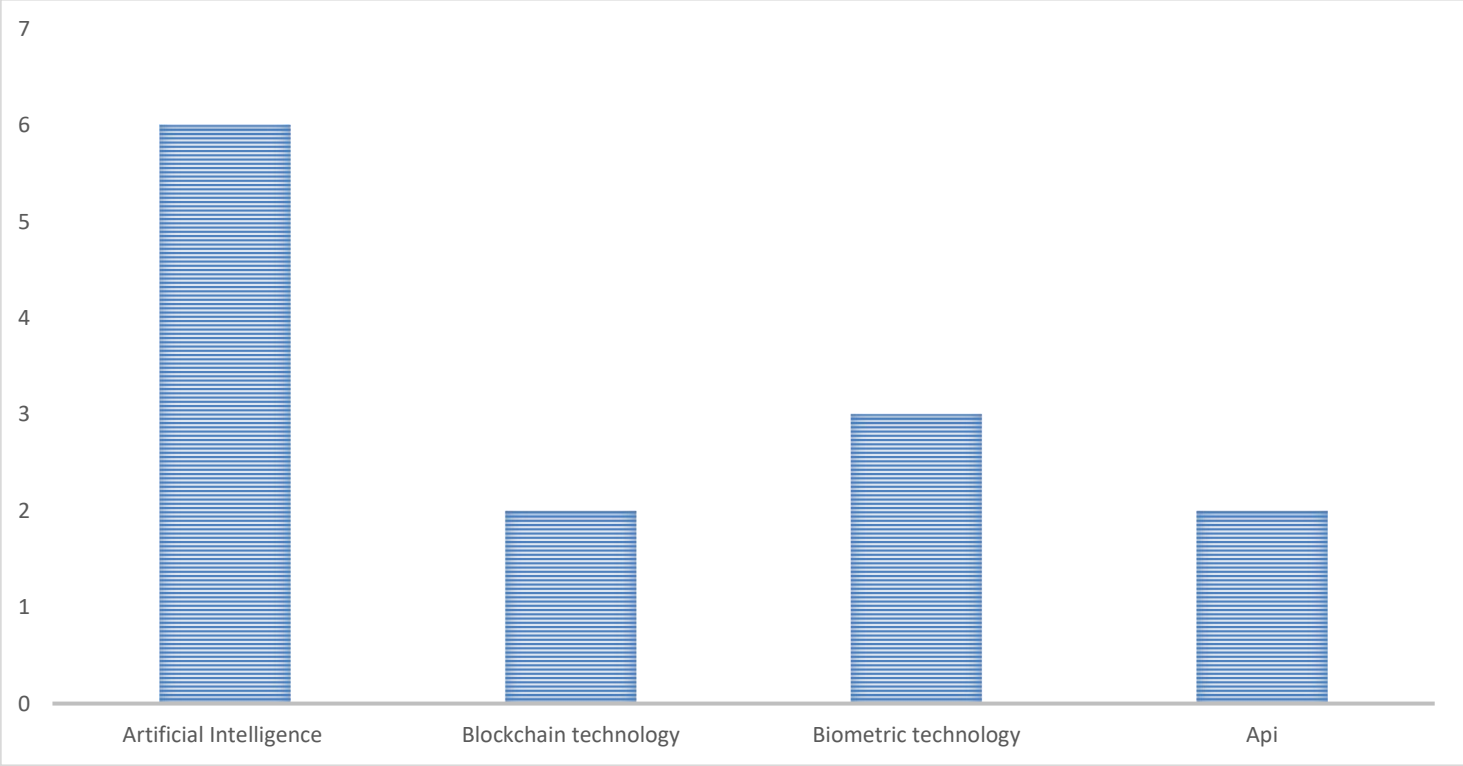
Respondent 7 and 8, say the bank should continue improving on the value proposition that they already provide, i.e. integrate the customers lifestyle into the banking platform

Respondent 5 says another alternative solution is allow FINTECH's to develop solutions for a niche market and once they have an established customer's base, the bank should buy the FINTECH with it's
customers.

Graphs for Analytics Four

Implementation of technology

Artificial Intelligence	**Blockchain technology**	**Biometric technology**	**Application Programme interface**
6	2	3	2



Collaborate with Fintech's	Build Solutions in-house	Acquire the entire fintech
6	1	1
75%	12.5%	12.5%