THE IMPACT OF INDUSTRY 4.0 ON THE WORKFORCE WITHIN A BUSINESS BANKING: PROJECTS AND OPERATIONS ENVIRONMENT

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DECLARATION

I, Jared Subramanien, 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

Literature defines Industry 4.0 as a concept that is critical to adopt in organizations to remain competitive. It is an entire new way of breaking the traditional approaches of operation in an organization. The changes brought about will also impact the workforce with the Banking industry.

The first objective of this study was to develop a conceptual framework and thereafter evaluate the implementation of Industry 4.0 in a Business Banking: Projects and Operations environment in a particular Bank. The impact to the workforce in this setting was then understood to answer the critical research question which was to identify the impact of Industry 4.0 on the workforce within a particular Business Banking: Projects and Operations unit. A qualitative research approach was undertaken to understand the phenomenon. Semi-structured interviews were designed, based on the conceptual framework, and administered to eight subject matter experts within the unit and the results were analysed.

The Business Unit is well advanced in implementing disruptive technologies and at a moderate level in terms of transforming current processes and operations. The Business Unit also transforms existing architecture to suit the design principles of Industry 4.0. All these changes impact the workforce in the Business Unit such that it requires a modification of the working environment as well as modification of job profiles for both the lower and higher skilled workforce. Industry 4.0 was seen to present opportunities and threats to the workforce in terms of new roles offered as well as the possibility of certain roles becoming redundant.

Recommendations are presented for further research so that the research can be generalized. Further to this, recommendations are presented to the Business Unit to assist the workforce in an ever-changing digital world.

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LIST OF ABBREVIATIONS

Abbreviation	Description
AI	Artificial Intelligence
CPS	Cyber Physical Systems
CRQ	Critical Research Question
HR	Human Resource
I4.0	Industry 4.0
IoT	Internet of Things
IoS	Internet of Services
IT	Information Technology
IQ	Interview Question
M2M	Machine-to-Machine
OCR	Optical Character Recognition
P2P	Peer-to-Peer
SME	Subject Matter Expert
TQ	Theory Question
US	United States

GLOSSARY OF TERMS

Term	**Definition**
Big Data	Large data sets that can be analysed to reveal patterns and trends derived from human behaviour
Business Banking	A segment of the bank that deals only with businesses
Business Unit	A functional area of an organization that represents a specific line of business
Computerization	The process of controlling or storing information by means of a computer
Customer centric	A strategy of doing business that focuses on the best experience for the customer
Digital channels	A digital platform through which bank's make services available to customers
Digital transformation	The process of using digital technologies to create or modify business processes to meet changing market conditions
Digitization	*see digital transformation
Disruptive technologies	A technology/innovation that alters the way industries operate
Fintech	Computer programs and other technology used to support or enable banking and financial services
Hard skills	Learned abilities acquired through practice, repetition, and education
Operating framework	A strategy used by businesses to align its people to a common vision to achieve predefined goals
QR code	A machine-readable code that is capable of storing data
Robotization	The process of automating industrial tasks
Snapscan	A mobile payment application for cardless transactions
Soft skills	Personal attributes allowing an individual to interact effectively with others
Workflow	A sequence of processes through which a piece of work passes from initiation to completion
Work environment	The elements of a setting in which work is carried out
Zapper	An application that allows customers to pay using a smartphone

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Technology is significantly impacting day-to-day living. The increasingly connected culture we live in impacts the world of Industry giving rise to the fourth stage of industrialization known as Industry 4.0 (I4.0) (Kagermann, 2015). Pereira & Romero (2017) describes Industry 4.0 as a concept that embraces a set of future developments such as Cyber-Physical Systems (CPS), the Internet of Things (IoT), the Internet of Services (IoS), Robotics, Big Data, Cloud Manufacturing and Augmented Reality. It is imperative for companies to adopt Industry 4.0 concepts and related technologies to embrace the trend of adopting frameworks of interconnectedness between people and objects which as a result allows companies to remain competitive in their market (Ślusarczyk, 2018). The integration of technologies, under the concept of Industry 4.0, is a drive towards breaking traditional approaches of operation and pursuing a drive toward efficiency (Ślusarczyk, 2018).

Bonekamp & Sure (2016) suggest that the implementation of I4.0 will significantly impact the labour content and work organization to the extent that it influences the way people add value to the value chain within an organization. The impact is far reaching within an organization with not only the uneducated workforce being affected but also the educated workforce, who perform highly skilled job functions, through software algorithms that are able to perform analysis and consequently make automated decisions (Ford, 2009).

The Banking sector is no exception to the above, with the Industry going through high technological development due to digital transformation in recent years (Padmaavathy & Adalarasu, 2015). Cuesta, et al. (2015) states that for Banks to introduce new digital channels and products to position themselves in a competitive environment, they need to embrace technological adaptation. This is the process in which an in-depth technological platform change is required to move toward a more modular and flexible approach to speed up the development of new products. This as a result causes a modification of the work environment and job profiles (Cuesta, et al., 2015).

Due to Industry 4.0, Bank digitization has become an integral part of the strategic plans for most banks as they seek to exploit the rise of new digital technologies to remain competitive (Mekinjić, 2019). As part of a study conducted by Deloitte, South African Banks are recognized as adopting digital concepts and technologies at a rapid rate to transform traditional day-to-day banking processes (Deloitte, 2018). Chhabra Roy & Viswanathan (2019) state that digital disruption is destined to reinvent the workforce in the banking industry with the potential of also introducing new challenges to the workforce. Thus, the impact on the banking workforce of the changes brought about by the introduction of I4.0 in banking environments requires further investigation.

1.2 CONTEXT

The Business Banking: Projects and Operations unit in a particular bank is selected as the context for further investigation. This unit has 3 main areas which include Projects, Operations as well as IT shops. Within this Business Unit the function is to manage strategic projects and programmes that not only impact Business Banking but also Retail and Corporate Banking within a particular bank. The Business Unit thus purposes itself as a unit responsible for the implementation of projects that enhance capability on enterprise-wide systems to cater for the ability to introduce new products to the market. This is done using internal IT shops or external vendors. Operations is responsible for the ongoing support (both internal and client facing) of these systems and products.

1.3 PROBLEM STATEMENT/MOTIVATION

The banking unit under study has a strong digital strategy which is motivated by the need to align to customer's ever-changing requirements in an efficient way. The recent drive within this Business Banking: Projects and Operations Unit has been pursuing a strategy to minimize operational cost as well as implementing high value business benefit solutions to remain profitable whilst aligning to the overall digital goals of the organization. The focus has been on the implementation of projects that promote interconnectedness between systems and removal of repetitive tasks and redundancy through exploiting a host of technological concepts. Consequentially the roles of many employees have been redefined with specific expertise required that focus on managing operations and creating innovative solutions in a technology driven environment. Some roles have also become obsolete through automation which has resulted in the elimination of manual intervention for specific business processes.

The Banking workforce needs to ensure that they can adapt to working within an environment that is required to produce innovative solutions to customer's needs in an ever-changing digital world. The impact of I4.0 on the workforce in this business banking unit thus needs to be investigated.

1.4 RESEARCH QUESTIONS

The above leads to the critical research question.
What is the impact of Industry 4.0 on the workforce within a particular Business Banking: Projects and Operations unit?

1.5 RESEARCH OBJECTIVES

The main objective of this research is, thus, to investigate the Impact of Industry 4.0 on the workforce within a particular Business Banking: Projects and Operations unit.
This will be achieved by:

a. Developing a Conceptual Framework, through related works, to understand the possible implications of the concepts of Industry 4.0 on the workforce.

b. Evaluating the implementation of Industry 4.0 within a particular Business Banking: Projects and Operations unit through the lens of the framework.

c. Identifying the impact of the changes due to Industry 4.0 on the workforce within a particular Business Banking: Projects and Operations unit.

1.6 RESEARCH METHODOLOGY

Collection of data was done by means of semi-structured interviews that were conducted with the target population. The target population for the research included eight Subject Matter Experts (SME's) from a Business Banking: Projects and Operations environment within a particular Bank. The interview questions were constructed to determine the current use of Industry 4.0 concepts and the impacts to the workforce. The research study was qualitative and descriptive. Interviews were conducted with SME's who have multiple years of experience in working with technological concepts and were thus able to narrate the changes brought about to the department through adoption of these concepts. Reliability of the research was proved with providing adherence to the concepts of Credibility, Dependability, Transferability and Confirmability. Validity of the research was proved through construct, internal and external validity.
The data analysis was done in Microsoft Excel. The ethics clearance number is MIAEC 114/20.

1.7 OUTLINE OF CHAPTERS

1.7.1 Chapter One: Introduction

This chapter introduces the research topic and presents a summary of the research problem, background, objectives, and research methodology.

1.7.2 Chapter Two: Literature Review

The literature review chapter provides an outline of Industry 4.0 and the potential impacts to the workforce. It elicits content from the already existing body of knowledge, comparing multiple views from existing research and studies to gain an understanding of the phenomenon in the Banking Industry.

1.7.3 Chapter Three: Research Methodology

This chapter explains the methodology that was used to collect the data for this study. It provides detailed information on the sample population, the measuring instruments, the process of data collection as well as the data analysis thereof. Additionally, the validity and reliability of the data is assessed whereby any shortcomings are highlighted.

1.7.4 Chapter Four: Results and Discussion

Chapter four statistically analyses the collected data and displays the data in various illustrative ways for easy interpretation.

1.7.5 Chapter Five: Conclusion

The final chapter provides the conclusions gained from the analysis of the data and comparison to related literature. Finally, recommendations are made for further study on the topic.

CHAPTER 2

LITERATURE REVIEW

The purpose of this literature review is to first to briefly outline the concepts of Industry 4.0 from a holistic view.; Next, the potential impacts on the workforce is investigated, through related works. The application of Industry 4.0 to the Banking Sector is then discussed to provide background to the environment in which the research is being conducted. This section develops a conceptual framework whereby understanding can be obtained from preceding associated literature.

2.1 INDUSTRY 4.0 - AN OVERVIEW

Some authors focus on Industry 4.0 as a concept involving elements of automation and digitization linking the physical and virtual worlds to assist in process management (Brettel, et al., 2014). Others describe it as a digital transformation concept within traditional strategies and processes of companies as a result of innovative solutions being required by customers (Kagermann, 2015). It can also be used as an umbrella term for the application of various new technologies which exploit the latest digital trends. A study conducted by Schmidt, et al. (2015) shows that disruptive technologies such as Big Data, Cloud-Computing, Mobile Computing, Internet of the Things and Cyber-Physical Systems are the drivers for Industry 4.0. Disruptive technologies are on the rise and is rapidly influencing the way we live and the interaction between clients and companies. Companies that embrace these technologies within the concepts of Industry 4.0 can react to changes in the market more rapidly by having a strategy that is innovative and customer centric, leading to faster design and more efficient processes.

Digital transformation and Industry 4.0 are strongly linked concepts (Lee, et al., 2017). It is through the rise of new digital technologies and the embracing of it by companies that the concept of a new way of operating is born. Through digital transformation, this allows for the possibility to gather and analyse data from various sources. This leads to faster and more flexible processes that produce a higher quality output with reduced costs (i-SCOOP, n.d). This drives I4.0 and within this revolution it is possible to imagine that the increase in productivity and immense change in industrial growth will play a significant role in changing and adapting the profile of the workforce to ensure competitiveness in a new digital world.

Industry 4.0 is adopted within organizations by application of new technologies that is based within the six design principles of interoperability, virtualization, decentralization, real-time capability, service orientation and modularity (Hermann, et al., 2015). For the purpose of this study these design principles are summed up into the concepts below and briefly discussed as it is ultimately these concepts that influence the working environment.

2.1.1 Interconnectedness

Managing of ever-expanding data from a collection of various sources can be difficult when systems and processes are not aligned to a common framework. Qin, et al. (2016) regards interoperability as a core design feature of Industry 4.0 which is achieved through three major types of integration: horizontal, vertical and end-to-end integration. From an operational perspective horizontal integration creates a global value creation network including new business partners and customers as well as cooperation models (Deloitte, 2014). This helps a company focus its activities on its core competencies and establish partnerships to ultimately build an end-to-end value chain. Vertical integration is based on a need orientated and customer centric strategy which ensures that smart systems operate in a network that allows easy and efficient exchange of data (Deloitte, 2014). In essence, vertical integration provides the linking of all logical layers within the company from the smart systems to quality assurance, product management, IT, sales and so on. The transparent flow of data through these layers is crucial in providing companies with the competitive edge to respond appropriately and with agility to changes in the market through data driven strategic and tactical decisions. To achieve such interoperability through integration an organization needs to focus efforts on breaking down data and knowledge silos. This in turn creates an organizational culture change in which all departments and divisions are aligned to the organization’s long-term needs through the sharing of data.

The extensive integration of the entire value chain is largely influenced by digital transformation of the value chain though applications in IoT, Cloud computing and Big Data (Schmidt, et al., 2015). IoT enables the integration and provision of services via the internet. Products in use are then integrated with cloud computing services from which large amounts of useful data can be made available. This Big Data then provides the feedback loop to the value chain in turn creating the continuous flow of information that can be used to analyse and optimize processes within the value chain, be it from a business or product perspective. Industry 4.0 within this concept seeks to network individual elements to reduce complexity and increase efficiency within operations. The ability to process and collect data instantaneously and autonomously is only because of having integrated processes. These processes give rise to connected objects and services, linking the physical and digital worlds, which is undeniably a step towards a new industrial world paving a way for new business opportunities

Companies that do not operate on interconnected architecture, and in turn use various systems to perform similar tasks, makes it impossible for employees to work effectively. The business opportunities of making use of interconnected architecture through integrated systems and business processes can result in companies, departments and functions becoming more cohesive as networks evolve and thus enable automated value chains (Bonekamp & Sure, 2016). Interconnectedness thus promotes productivity in terms of cost and time reduction as employees will be able to focus on tasks at hand rather than performing repetitive tasks that will be eliminated through integration. This ultimately leads to improved customer satisfaction as time taken to offer products and services can be greatly improved through integration.

2.1.2 Flexibility

To rapidly respond to changes in industry and ensure client satisfaction by providing innovative solutions to customers, Industry 4.0 is embraced within an organization to adopt a flexible approach of operating. Flexibility, as a concept, is largely influenced by three design principles in real time capability, service orientation and modularity. Companies need to have the capability to collect useful data in real time and the ability to store or analyse this data (Hermann, et al., 2015). This influences market research as well as internal processes so that defects in the product or system can be detected and tasks can be delegated thus optimizing the production or service network. Non-core activities can be reduced or eliminated allowing staff to focus on critical business functions.

Another key element of Industry 4.0 is adopting a service orientated strategy that is customer centric. The introduction of digital trends in CPS, IoT, open product architecture and automation has enabled the assessment of customer's behaviour in order to continually adapt the product to the customer's preferences (Qin, et al., 2016). Similar to service orientation, for businesses to remain flexible to changing market conditions modularity is adopted from both an operational and system perspective (RMIT University, 2020). From an operational point of view organizations can have well defined teams that focus on a specific business operation. From a system point of view the organization needs to move away from linear and rigid systems to adopt more agile systems that can respond to ever-changing circumstances and requirements (Gilchrist, 2016). Organizations who previously invested in linear systems often find themselves locked in an inflexible technology that is not easily adaptable to disruptive changes occurring across industries (Swisslog, n.d). With the transition to modular and agile systems, this creates scalability without abandoning the initial investment by allowing for flexibility. Such can be seen with integrated software platforms that allow organizations to purchase only what they need currently and add more in the future as needed.

Business is changing more quickly than it ever has before (Sharma, 2017). Entire organizations and industries are being disrupted in sudden and unexpected ways due to new technologies to the market. It is imperative for organizations to remain adaptable which causes them to move towards a flexible operating framework involving people, processes, and services (Aghina, et al., 2018). This helps organizations to focus on what they do well with staff becoming specialists in core activities and core activities expanding as the business grows thus increasing flexibility and scalability. More and more organizations are embracing agile business models which break the traditional top-down organization structure and encourage cross- collaboration between teams which results in an efficient way to respond to external feedback or stimuli.

2.1.3 Decision Making

Qin, et al. (2016) regards "consciousness" as the core design principle of Industry 4.0 that supplements interoperability which is as a result of decentralized decision making. Hermann, et al., (2015) further states that the need for decentralized decision making is brought upon by the need for customization in a flexible product or service providing environment. This is ultimately the ability for systems and processes to discover the knowledge, through advances in Big Data and Analytics, and make independent and intelligent decisions using Business Process Automation and Artificial Intelligence functions. Logic does not reside within one system to perform multiple tasks but is more rather spread across multiple systems to maximise response time and flexibility. This allows for a layered decision process with each layer having a view of the operations below it facilitating a decision response structure that is autonomous for the most part except for the most challenging decisions or exceptions (Metcal Marketing, 2020).This ability is imperative for a company seeking to increase responsiveness and lower costs to remain competitive in their market.

It is possible to imagine the wide range of business advantages through automated decisioning. From a process perspective, the streamlining of processes through automated decision making means less interruption in workflows due to tasks being delayed as a result of being put into work queues (Sheshasaayee and Bhargavi, 2017). Automated decision making does not necessarily have a down time and can operate beyond conventional business hours decreasing the reliance on manual intervention within workflows. In workflows in which error detection and correction are done using manual labour, these decisions can be done by an algorithm thus freeing up key resources, saving time and ultimately operational costs.

2.2 POTENTIAL IMPACTS TO THE WORKFORCE

According to Deloitte (2017) Industry 4.0 could significantly change the work employees do and the way that they do it. Deloitte further states that the rise of smart automation and connected systems changes the organization's workforce requirements in terms of skills required, what tasks need to be done and what roles are required thereof. World Economic Forum (2016) in the Future of Jobs Report on Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution, states that by 2020 more than one third of the skills that were considered important for the workforce in 2015 would have changed. World Economic Forum (2016) sees the critical skills needed by the workforce in 2020 in order of importance as, (1) complex problem solving, (2) critical thinking, (3) creativity, (4) people management, (5) coordinating with others, (6) emotional intelligence, (7) judgement and decision making, (8) service orientation, (9) negotiation and (10) cognitive flexibility. It can be seen that in order for the workforce to add value in a changing digital world the workforce needs to have a combination of "hard" and "soft" skills. Organizations require workers with this hybrid skill set in order to perform effectively and sufficiently in Industry 4.0 work circumstances. This can be seen as both a challenge and enabler to the workforce. Connected enterprises result in the availability of data. This in turn may require workers to perform complex and unpredictable tasks that require the ability to access and understand that data. Connected enterprises also require the workforce to be willing to collaborate, communicate and adapt to remain relevant (Ustundag & Cevikcan, 2017). Employees thus need to continuously upskill themselves not only within their own area of expertise but also to other areas of work. New technologies incorporated into day-to-day workflows give rise to new training needs by the workforce that will upskill and bridge the skills gap for workers to adapt in an Industry 4.0 working environment. Ustundag & Cevikcan (2017) states that while organizations need to invest in the skills of the workforce, the workforce also needs to take on the responsibility of acquiring new skills for staying in the job market. This makes employees who have the capability to continuously adapt vital to an organization going through technological transformation.

As new products and services are enabled, the use of smart digital and physical technologies can also result in the outcome of new job roles. A study conducted by the Boston Consulting Group, within the German Manufacturing Industry, found that the implications derived from Industry 4.0 would result in the creation of new jobs in Germany with the growing need for specific technical expertise in the fields of IT, analytics and research and development (Boston Consulting Group, 2015). Furthermore, job roles would be redefined and newly created all together by exploiting the opportunities in flexible production processes, innovative business models, augmented reality and automation. According to Manyika & Sneader (2018) new technologies result in 60 percent of all occupations having 30 percent of activities that can be automated. What this means is that, to a certain extent, some activities within a job role can be partially performed through the use of automation and AI. This will cause highly skilled job roles to be redefined by incorporating technology into daily activities and can increase the output and productivity of workers with lower skilled job roles. Ustundag & Cevikcan (2017) suggest that there will be a higher demand placed on all members of the workforce to incorporate managing complexity and problem solving in their job roles. The workforce will also be expected to act on their own initiative and coordinate tasks between manual and robotic systems. Ustundag & Cevikcan (2017) also states that this will lead to opportunities for the workforce in individual responsibility, decentralized leadership and involvement in decision making. In this sense, the World Economic Forum (2018) predict that the job roles increasing between 2018 and 2022 will be, Data Analysts and Scientists, Software and Applications Developers, and E-commerce and Social Media Specialists. Roles that benefit from ‘human' skills, such as Customer Service Workers, Sales and Marketing Professionals, Training and Development, People and Culture, and Organizational Development Specialists as well as Innovation Managers are also expected to grow in demand. Görmüş (2019) states that these new job opportunities that arise due to Industry 4.0 are also likely to be in non-standard formats such as part-time, temporary or on-call rather than standard full-time employment. It is thus seen that researchers believe with the usage of Industry 4.0 technologies, the increased productivity along the entire value chain leads to a change in the nature of work as well as the creation of new job prospects, particularly in target industries, depending on the demand.

Contrary to this, some researchers argue that technological advancements will result in job losses and lower wages as labour is replaced through automation. Frey & Osborne (2017) undertook a study within the US Labour Market to assess the susceptibility of jobs to computerization across 702 occupations. To do this they separated occupations into high, medium and low risk occupations on the basis of their likeliness to computerization. The result is that 47 percent of US jobs is at risk to becoming redundant due to computerization. The risk is to routine intensive occupations, as occupations mainly consisting of well-defined procedures can be performed through the emergence of sophisticated algorithms. As a result, most of the lower skilled jobs would be replaced with technology resulting in the remaining jobs becoming more complex and comprehensive. The research further points to increased risk for the loss of jobs in occupations within transport, logistics, office and administration and production. According to Frey & Osborne (2017) the susceptibility of jobs to computerization is seen particularly within the service industry, which has experienced significant US job growth in recent decades, as a result of the growth in the market for service robots. In a study conducted across several occupations in Turkey, to determine which occupations can be substituted through Industry 4.0, occupations were classified into job categories and it was found that the extent of which jobs can be substituted depends on the number of routine and non-routine tasks in each occupation (Sumer, 2018). The study concludes that occupations that require a high degree of education or specific skill set will rarely be replaced with new technologies due to the cognitive and abstract nature of the job. Manual occupations dealing with routine tasks are more likely to be replaced in the near future as they have increased susceptibility to robotization, automation and digitization. It can be seen from this that the impact of Industry 4.0 on the workforce is related to the skill level of the workforce and the number of routine tasks within the occupation. The impact to the higher skilled workforce is significantly less than it would be to the low to middle skilled workforce as there are more tasks that require flexibility in decision making and cannot be streamlined through automation.

In a study conducted by Bonekamp & Sure (2016) to assess the consequences of Industry 4.0 on both the labour content and work organization, it was found that there would be a decrease in low skill tasks due to Industry 4.0 related concepts and an increase in high skill activities, planning, control and IT orientated tasks. In terms of the modification to the work environment, adopting the concepts of Industry 4.0 would lead to a more adaptable and flexible working environment which also in turn results closer cross functional co-operation between different company units and to some extent cross-company partner networks. The research points to a substantial change in the nature of jobs, future workplace and the labour force. Many existing jobs will be replaced by new jobs through automation with a decrease in demand for lower skilled workers and an increase for higher skilled workers which ultimately creates inequality in the labour market. Bonekamp & Sure (2016) state that with this, the possibility of a new way of way of working emerges in an integrated working environment that encourages a flexible work-life and the breakdown of silos in order to pursue efficiency and innovation. In an Industry 4.0 working environment, employees would be able to share real-time data and insights to make more accurate decisions in the workplace.

From the research conducted above it is evident that the global labour market is significantly impacted by the adoption of new technologies in a developing society through the transformation brought about by I4.0. This transformation can work for and against the workforce. If managed correctly it can lead to the creation of new jobs and a new age of efficient working (World

Economic Forum, 2018). Such can be seen in IT orientated working environments with the emergence of previously unheard-of job titles such as change managers, system architects and chief information officers, to name a few, in order to ensure that the end to end process of a digital solution is effectively managed and implemented. However, if this transformation is managed poorly it can widen the skills gap and all together diminish the workforce in both high and low skilled job roles. With the use of emerging technologies in almost every industry becoming a normality to be competitive in a digital market, it is important to consider the impact on the workforce from a job role and way of work perspective.

2.3 INDUSTRY 4.0 - A BANKING PERSPECTIVE

2.3.1 The need for Industry 4.0 in the Banking Sector

Current literature, as outlined in Section 2.1 and 2.2, proves that the world is going through significant changes through Industry 4.0. This concept impacts not only the manufacturing industry but also the service industry who are continuously seeking for innovative solutions to suit the client. Financial industries, in particular, have leveraged of Industry 4.0 technologies with the use of the internet and smart mobile phones in order to shift the organizational focus to designing and developing pre-designed and personalized services for their customer base.

In today's world a significant portion of bank customers are young to middle age people with different expectations as compared to previous generations (Raval, 2019). Banks cannot continue to operate on existing business models to meet these new expectations. The behaviour of customers and access to data allow for digital transformation in Banking and allow Banks to break away from the traditional business models in order to respond efficiently to the client's needs and provide secure and simple services (Mekinjić, 2019). With new technologies and mobile platforms, customers have become accustomed to a more convenient user experience. Previously banking functions could only be performed at a branch by customers with the assistance of client facing consultants (Sadovska & Kamola, 2017). An example of this is deposits and transfers. In the new digital world, most banking functions have been made available on digital platforms such as online banking and banking applications, with the convenience of the customer in mind. Padmaavathy & Adalarasu (2015) states these platforms as "channels" to which there are multiple channels that banking services are now made available to customers. Maximizing revenue for the bank is done through determining the optimal channel mix for each customer while reducing costs without impacting customer experience. This influences the customer's future banking behaviour and allows for cross selling products and reducing cost of service. This is only because of streamlining back end business processes through a host of digital technologies and concepts

In a survey conducted by Tata Consultancy Services (TCS) in 2018 across 11 industries and 18 countries, including 188 respondents being executives in the banking and financial sector, TCS assessed the adoption and impact of leveraging on the latest digital trends. It was found that financial institutions are using technology as a foundation to not only offer mass personalization but also to influence three critical business behaviours (Tata Consultancy Services, 2018). The first being the creation of exponential value. This is accomplished by adopting new business models that leverage value and address new markets. Data management is key to this revenue generation with some banks offering open banking platforms to help customers manage their own data. Some banking institutions also make this data available to commercial organizations to generate revenue and allow these organizations to plan for business expansion and forecast demand. The second being leveraging ecosystems which is done by collaborating with partners to develop new services. This can be accomplished through connected platforms offering customers a connected experience and also collaborating with fintech companies to develop infrastructure. Tata Consultancy Services (2018) lastly states that Industry 4.0 is required by banking institutions to embrace risk by moving beyond operational barriers through strategic agile planning. All of this being accomplished by adopting key advances in digital trends such as cloud computing, the internet of things (IoT), automation, artificial intelligence (AI) and advanced data analytics or the use of big data according to TCS.

A study conducted by Rega (2017) considered technologies, among others, such as IOT, AI and Big Data to show that the adoption of banking innovations based on these technologies positively influences financial performance. This research points to the importance of embracing technological transformations for the banking sector under the umbrella concept of Industry 4.0.

2.3.2 The Application of Industry 4.0 in the Banking Sector

2.3.2.1 A Product View

Banks understand the need to invest in innovation and use their investment capacity to enhance their position in the market and develop new offerings to clients by incorporating digital innovation and partnering with financial technology companies, or defined by the more commonly used term of "FinTech", into their operations (Sadovska & Kamola, 2017). By doing this they remain competitive and raise customer satisfaction. Analysing the research report undertaken by Centre of

Excellence in Financial Services (2017) on the Impact of Industry 4.0 on South African Financial Services in response to the research conducted by World Economic Forum (2015) from a global context, the below aspects are discussed to conform to a Banking perspective.

Payments

New functionalities are being built on existing payment mechanisms to cater for customer user experience through advances in the IoT. Banks are partnering with FinTech and developing their own solutions with smartphone payments which allow customers to transact without the need for a physical card. Many banks have adopted card pay-by-pay proxy solutions that use QR codes to accept payments for merchants with emergence of SnapScan and Zapper. The report also predicts that in coming years e-commerce, the buying and selling of goods over the internet, is expected to rise in South Africa forcing Banks to introduce integrated payment platforms. With greater adoption of electronic payments, this allows for the accumulation of data from transactions. As such this data can be used to better understand the customer’s needs.

Deposits and Lending

Transformation is occurring in credit evaluation and loan origination through automation. Within the South African context Peer-to-Peer (P2P) lending, asset financing and alternative scoring are seen as the disruptive innovations to the lending market. Alternative scoring is significantly impacting traditional bank processes that credit assess clients. This can now be done by automation through the pooling of unconventional sources of data such as social media, bank transactions and behavioural data rather than cash flow and credit history. Automated processes streamline loan processing for an enhanced customer experience. The understanding of risk profiles for borrowers improves thus allowing potentially greater returns on lending products and decrease the risk of loan defaults.

Investment Management

Automated investment advisory functions are emerging forcing traditional advisors to evolve through advanced data analytics. Banks, in response to new entrants into the market, are moving towards innovating their solutions in advisory services, trade execution and back office processes within the investment management market. The report suggests that Banks will benefit significantly from investing in back office technologies as cost implication savings can be substantial as the increase in back office automation decreases the need for highly skilled workers to perform specific tasks which ultimately will reduce operational cost.

Market Provisioning

Corporate and Investment banks help companies' structure public share offerings. Advances in Big data analytics and AI provides institutions with the ability to respond to real time events more rapidly. Disruptions to this market include smart machines and alternative platforms that connect buyers and sellers. Bank's are thus prompted to improve their trading algorithms without the use of human intervention and use AI as the key concept when developing predictive modelling solutions.

2.3.2.2 A Transformational and Strategic View

From the above it can be seen that for banks to thrive in an ever-changing digital world they need to adopt innovative digital solutions in IoT, Big Data, automation and AI, which also alludes to the study conducted by TCS. However, producing innovative product offerings has knock on impacts on transforming banking operations. According to Dapp (2015) Banks need to adopt a systematic digital strategy. This involves the transition to a platform based digital ecosystem. To achieve an operational strategy that is based on digital principles Padmaavathy & Adalarasu (2015) state that 3 factors in client centricity, openness to innovation and organizational flexibility is required in an organization. The research points to digital teams being a mix of IT and marketing officials with both the internal and external knowledge to provide innovative solutions with customer personalization in mind. This is based on technological and organizational agility with IT platforms being agile to allow for faster time to market and integrate to external services. This is in keeping with the research conducted by Cuesta, et al. (2015) which states that positioning the organization strategically to adopt a digital core is achieved by transforming current architecture to suit the need in response to the development of a new product or service and occurs withing 3 phases. The first phase is responding to new competition with the bank's reaction to changes in the supply and demand of financial services with the implementation of new digital channels and products. The second phase focuses on technological adaption that requires an extensive change to the technology platform to a more modular and flexible infrastructure. The final phase is strategic positioning in which bank's use their major investments in technology to adopt digital strategies with which causes significant change in the organization structure.

Digital innovation calls for swift generation and processing of large volumes of data from multiple sources, as a result, current system architecture that does not offer this capability needs to be remodelled. Cuesta, et al. (2015) further states that automation of processes plays a significant role in this as it removes manual and repetitive tasks to create greater efficiency. Back office and well as front office processes are transformed incorporating sophisticated algorithms and artificial

intelligence to make automated decisions. Padmaavathy & Adalarasu (2015) state that it is possible that such sophisticated automation is maintained outside of the Banks. Leading Banks are thus pressured into transforming their current IT platforms to be more agile by developing smart middleware, that process business intelligence, to integrate to third party systems as well as create flexible architecture that would aid in faster time-to-market of a product. It is possible to imagine that the changes brought about through Industry 4.0 will have a significant impact on the Banking workforce similar to the potential impacts identified earlier in this report.
Sadovska & Kamola, (2017) state that using automation or robotics in a bank employees duty reduces risk, improves quality, and improves processing time. The cost of implementation is initially high however it is worth in from a longer perspective as banks will need less employees to perform the same tasks on a daily basis.

Capgemini Consulting (2013) states that most banks focus on digital transformation of the front office however this does not fully digitize the customer experience. The back office is still very much manual, and paper based, and this results in greater operational inefficiencies and costs which leads to a negative impact on customer experience. Capgemini Consulting (2013) further states that this is also as a result of maintaining legacy systems and trying to transition from it is no easy task. It requires a readiness assessment to determine the percentage of legacy systems and current investment in automated solutions thereafter management needs to buy in and support systems established before transformational solutions are implemented.

According to a study conducted by Deloitte in 2018 across 248 financial institutions across 38 countries, Deloitte assessed the maturity of digital role players in the Europe, Middle East and African (EMEA) regions (Deloitte, 2018). From this study it was found that South Africa falls within the “Digital Smart Followers” category. This classification means that South Africa is in advanced stages in digitizing traditional banking functions through pursuing a digital core in banking operations. The report suggests that the bulk of banking operations being digitized falls into the categories of “Day-to-Day” Banking, which is the management of account functionalities as well as facilitating payments. It also falls into the category of “Expand Relationship” that looks at the cross selling of products such as loans, term deposits and investment funds. The study also notes that while digital maturity is high for South Africa, the market pressure on the South African banking sector is relatively low. This means that customer pressure, regarding expectations of digital products, and competitor pressure, regarding competitors leveraging their digital channels to an advantage, is still on the rise. It can thus be seen that the South African banking sector is in a good position to implement new technology to digitize bank services while having a low risk to the market pressure outlined above. Such digital transformation changes, however, will play a significant role in the nature of work for the existing and future banking workforce and it is therefore important to consider these implications.

2.4 CONCEPTUAL FRAMEWORK

To depict the overall picture of the research, a conceptual framework is developed to make conceptual distinctions and organize ideas as per the illustration below.

The illustration below shows that a need arises from the end client who consumes the services or products of a Bank. This is ultimately because of wanting day to day banking operations to be simplified and convenient. Advances in technologies such as IoT, AI, automation, Big Data and Cloud Computing drive the need for a digital solution required by the customer as outlined in Section 2.3.1. Customers are increasingly enjoying the simplicity of managing all their finances in one place and not having to queue at a branch. Benefits are realized in automated payments and deposits, faster credit evaluation and approval in the lending space, automated advisory functions within investment and automated solutions in structuring share offerings as indicated by the research conducted by Centre of Excellence in Financial Services (2017) in Section 2.3.2.

The above forces Banks to move toward a digital core by transforming processes through embracing I4.0 design principles and concepts in Interconnectedness, Flexibility and Decision Making to which the background was provided in Section 2.1. This is in order to respond to rapid changes in the digital world to ensure that the customer’s needs of simplicity and convenience are met whilst also remaining competitive in the Banking industry and responding to the pressure of FinTech companies that offer similar solutions. It is through this transformation, within these concepts, that the workforce operating in the age of the fourth industrial revolution is significantly seen to be impacted similar to the potential impacts outlined in Section 2.2. This initial conceptual framework will be tested in this study to understand the extent of the impact of the workforce through transformation of banking processes.

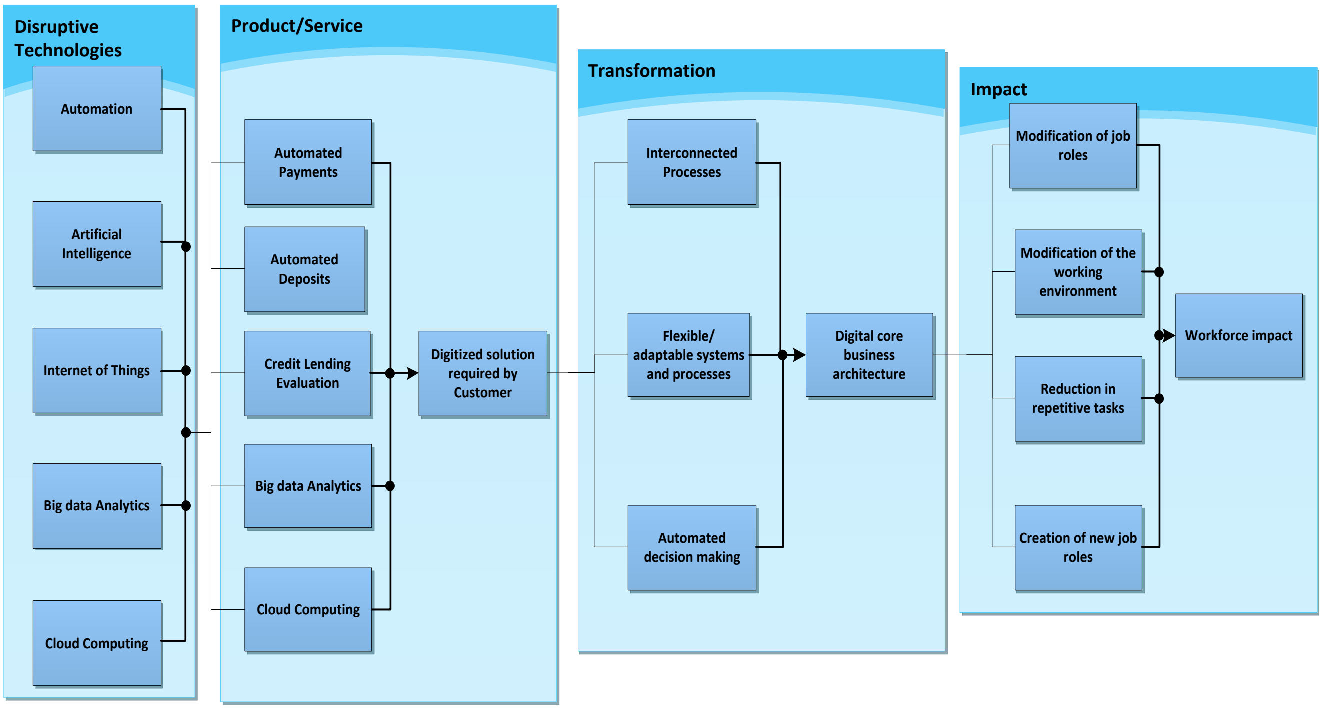

Figure 1: Initial Conceptual Framework (developed by author)

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

In order to develop a research method as well as to discuss the analysis of results obtained in this report, the research undertaken comprised of various sources which included 30 internet sources, 29 journal articles, 5 books, 3 reports and 2 conference papers.

The purpose of this chapter is to outline the research method used to collect the data. This method was influenced by the need to understand the conceptual framework developed in the previous chapter through existing literature. It begins with a description of the research design, sampling method used, collection of data and instrumentation, analysis of data and ends with proving reliability and validity.

3.2 RESEARCH DESIGN

To address the research question and objectives in this report, an appropriate research design must be identified and adopted. Industry 4.0 is a relatively new phenomenon to Business Banking in South Africa; hence the design of this research was exploratory. A qualitative research approach was undertaken. This approach is appropriate to listen to and investigate the participant's understanding of the phenomenon where little information exists on the topic (Austin & Sutton, 2014). Within the qualitative approach appropriate questions were developed based on the conceptual framework and interviews were conducted with subject matter experts (SMEs). This was to understand the impact of adopting I4.0 concepts in transforming banking processes on the workforce. From this, themes were determined using the subjective opinions of experts from which a comparison to the theory was conducted.

3.3 SAMPLING

Purposive sampling was used in this study. According to Etikan, et al. (2016) this sampling method is used when the researcher decides what needs to be made known and seeks individuals who are willing to provide information based on their knowledge of the phenomenon. It is a nonrandom technique that does not specifically require a specific number of participants or underlying theories and ultimately focuses on particular characteristics of individuals to assist in the research (Etikan, et al., 2016).

Eight Subject Matter Experts (SMEs) were selected from a particular Business Banking: Projects and Operations unit. Mason (2010) states that theoretical saturation, which occurs when no new concepts are formed, should be a determining factor for sample size. Morse (1994) states that in a phenomenological study each participant can be interviewed multiple times hence there are large amounts of data collected for each participant. This therefore requires fewer participants with the recommendation being between six and ten participants to reach saturation (Morse, 1994).

The interviewees were selected based on their experience with Industry 4.0 related technologies and concepts and associated with implementation processes and projects within a particular Business Banking: Projects and Operations environment. 75% of participants have an experience between 6 to 10 years in a Business Banking Space. This is followed by an equal percentage of 12,5% in the 0 to 5 and 11 to 15-year experience category. Participants were involved in technology related projects for several years with 50% having an experience of between 16 to 10 years followed by an equal split of 25% in both the 6 to 10 and 11 to 15-year category. Four interviewees were selected from a Project space, another two from an Operations space and the last two from an IT space thus representing all areas involved in the implementation of projects within this Business Unit. All interviewees were selected based on personal knowledge. The four representatives from a Project space included a Solution Strategist (holding a management role), a Solutions Architect, a Business Solutions Head and a Solutions Head (holding a management role). The two representatives from an Operations space included a Chief Operating Officer and Operations Head with both holding management roles. The two representatives from an IT space included a Chief Information Officer (holding a management role) and an IT Operations Head. 87% of participants have experience in the current role of between 0 to 5 years followed by 13% with an experience of 6 to 10 years.

3.4 DATA COLLECTION AND INSTRUMENTATION

A semi-structured interview research was undertaken with the participants as part of a descriptive method of data collection. Semi-structured interviews with subject matter experts within a particular Business Banking: Projects and Operations environment was conducted. This allows for a personalized discussion with the interview which results in the disclosure of detailed views from participants while at the same time allowing hypothesis testing of interview questions against the research topic (Leech, 2002).

The interviewing practice from Wengraf (2001) was used in this research study. This follows the CRQ-TRQ-IQ (critical research question-theory question-interview question) pyramid model from

Wengraf depicted below. Within this model the researcher needs to have a clearly defined Research Purpose which translates into a Critical Research Question (CRQ). The CRQ can then be split into several Theory Questions (TQ) which the researcher wants the interviewer to answer. Wengraf (2001) then states that Interview Questions/ Interview Interventions (IQ/II) then need to be developed to answer the particular TQ. The TQs only govern the development of the IQs, as they are formulated in the research community theory language whereas the IQs are formulated in the language of the interviewer. This is critical to avoid assumptions and instrumentation theory in the interviewee's response.

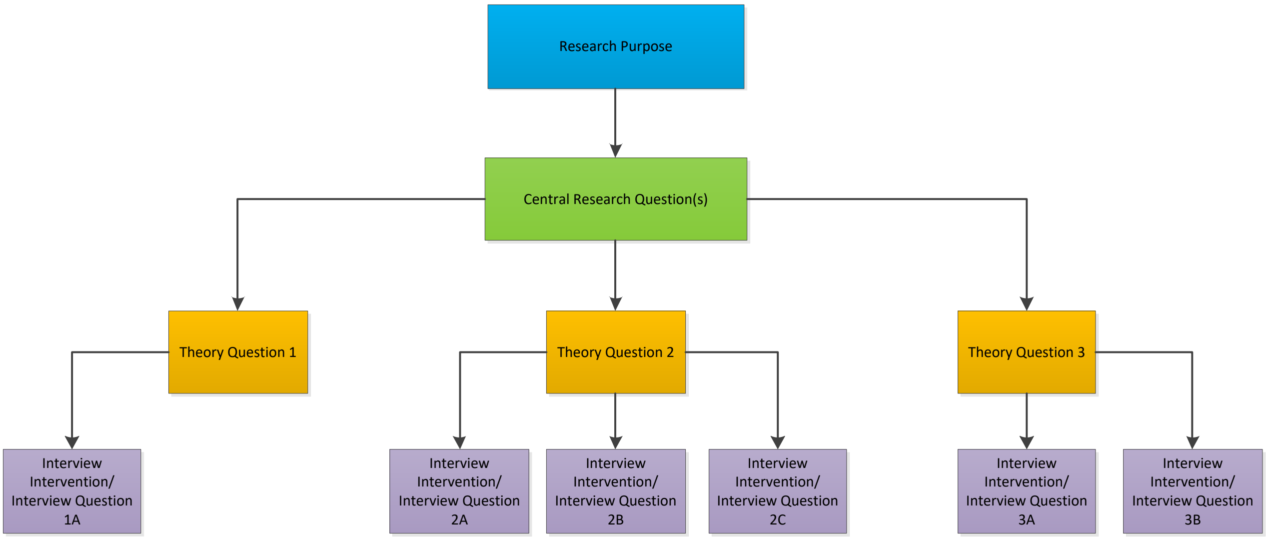

Figure 2: Pyramid Diagram showing Wengraf interview question approach (Wengraf, 2001)

The primary sources of data were collected from the interviews conducted with the eight SMEs within a particular Business Banking: Projects and Operations unit. Interviews were recorded and transcribed for further reference and analysis. Interviews were conducted by setting up virtual meetings of approximately 60 minutes.

3.4.1 Formulation of Interview Questions

The conceptual framework outlined in the literature review formed the basis of the interview questions as well as the reference for data analysis. The framework was used to develop the appropriate narrative or open-ended questions that were posed to the interviewee according to the pyramid approach from Wengraf discussed previously. This was to elicit responses on the current application of Industry 4.0 within the Business Unit and the extent of the impact of transformation, within banking processes using I4.0 concepts, on the workforce. Instead of placing emphasis on a question and answer format which may possibly result in yes or no responses, the conceptual framework was used to develop questions to provide an opportunity to the participant to narrate his or her experience on the phenomenon related to their area of work , be it within a projects, operations or IT space. Collecting data in such a way enabled an understanding of the overall picture of the phenomenon, in terms of current transformations in banking processes and its impact on the workforce, within this particular Business Banking: Projects and Operations environment.

The CRQ-TQ-IQ model was used to develop 4 theory questions resulting in 18 interview questions. Each subset of interview questions is depicted below according to this model.

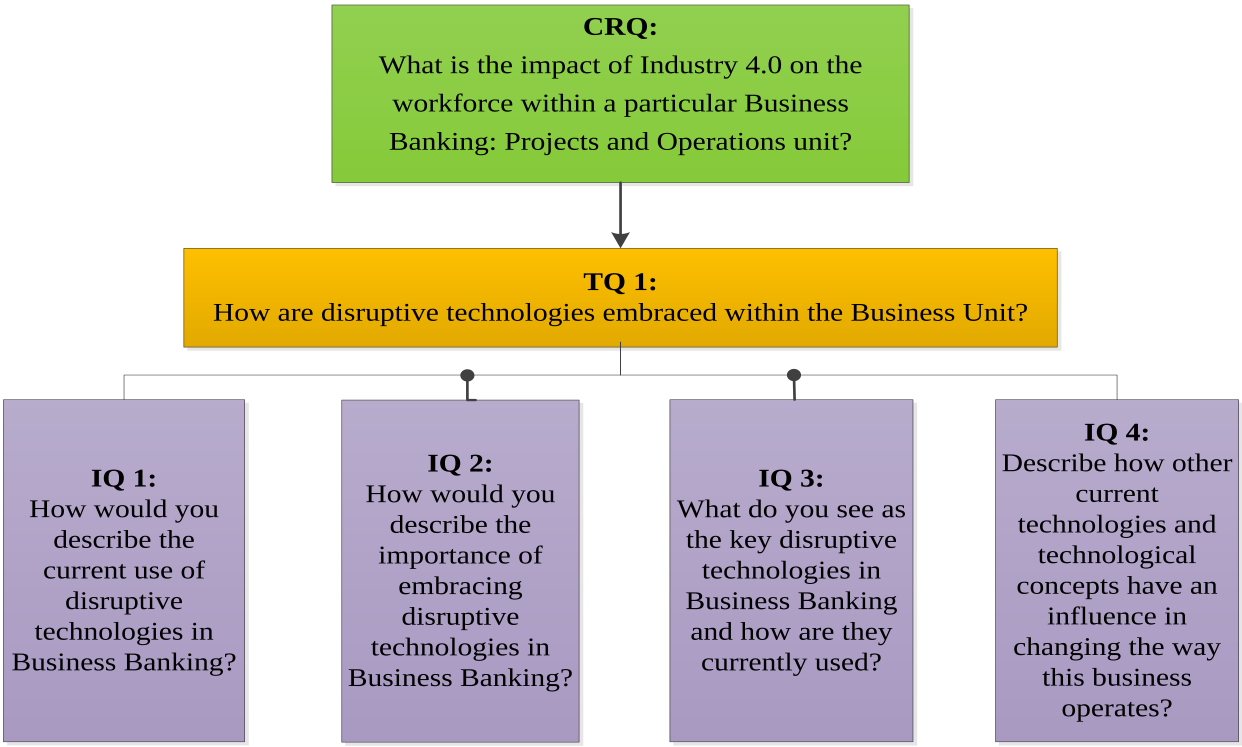

Figure 3: First subset of interview questions

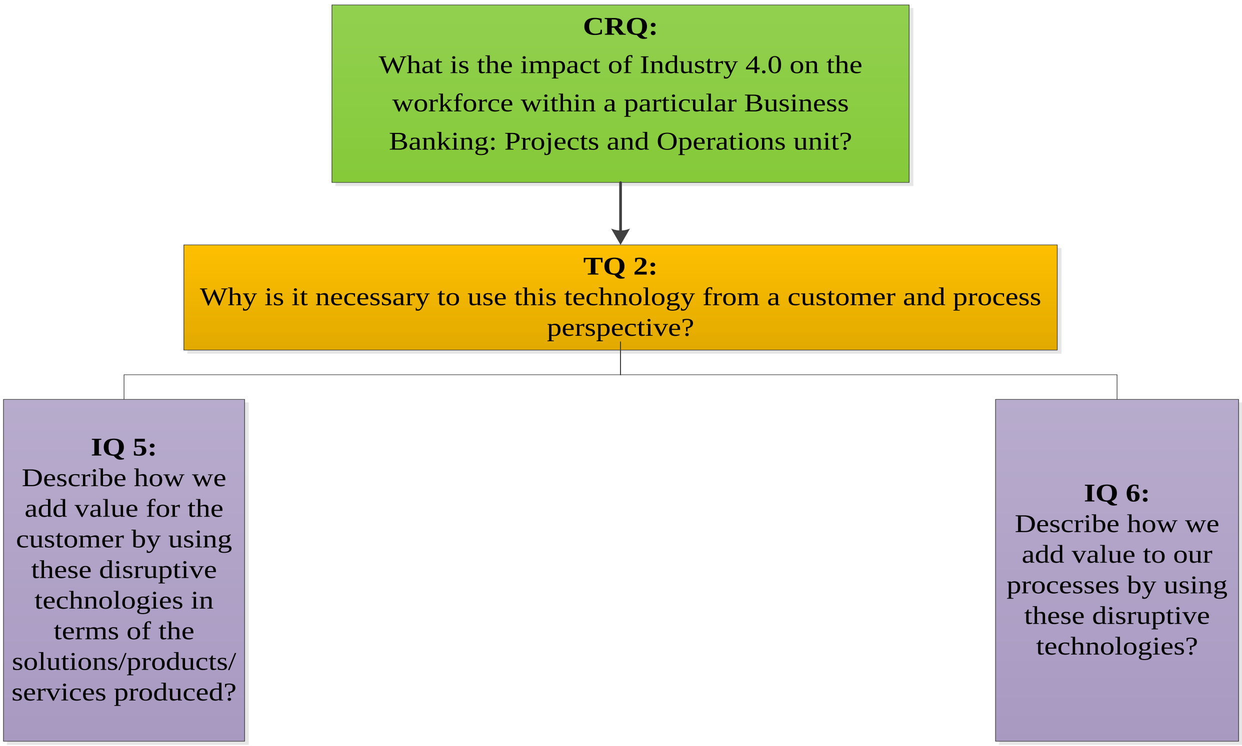

Figure 4: Second subset of interview questions

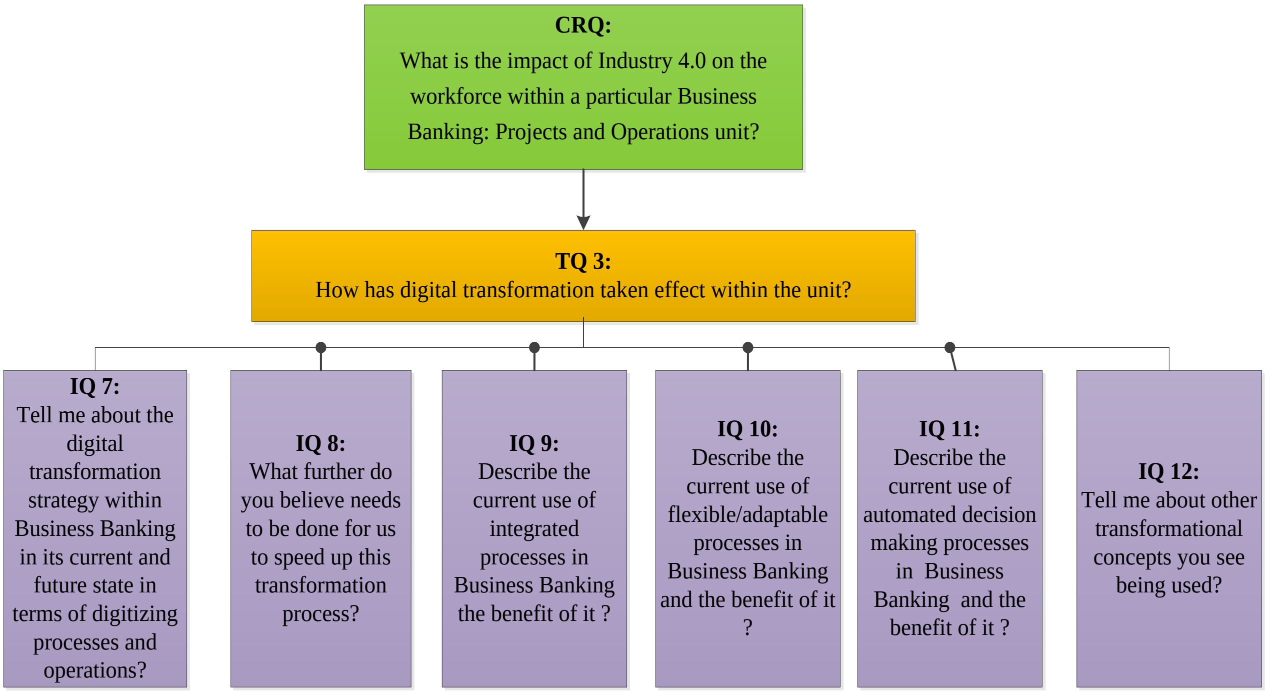

Figure 5: Third subset of interview questions

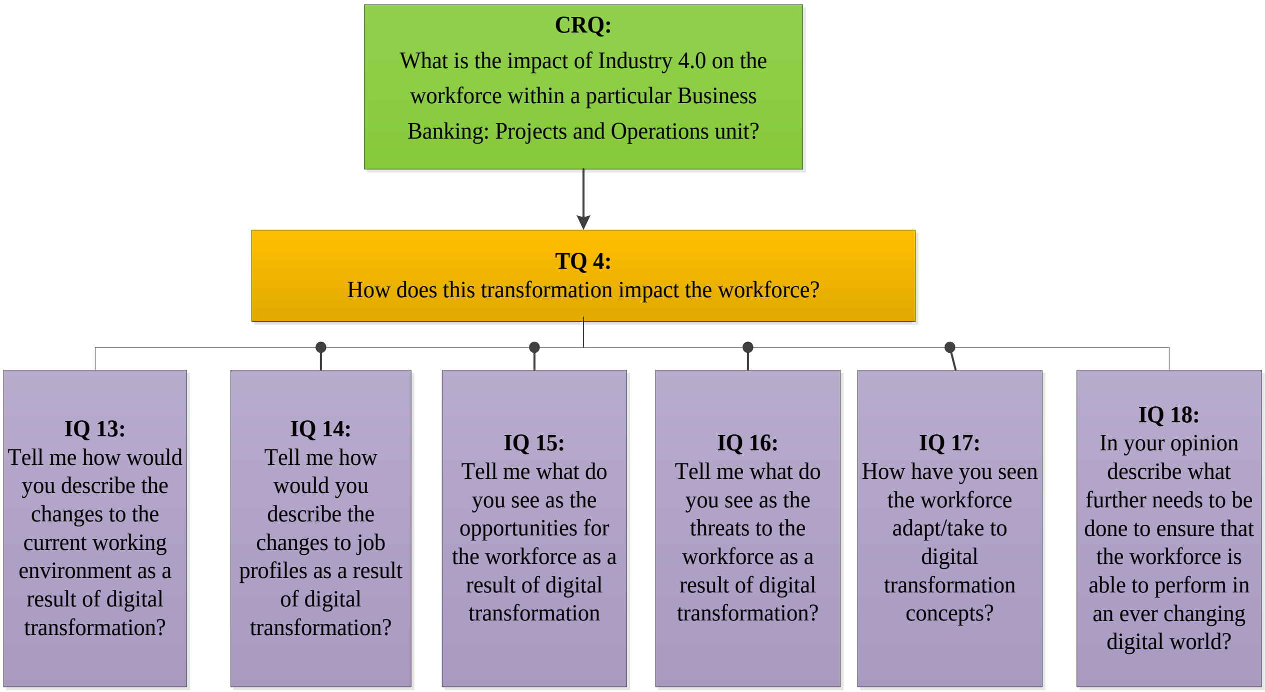

Figure 6: Fourth subset of interview questions

3.4.2 Administration of Interview

3.4.2.1 Letter of Information

The interviewees were introduced to the researcher and purpose of research through the participant letter of information sheet. This letter was emailed to the participants prior to the interview informing them of the date period the interviews will take place and the context of the research.

3.4.2.2 Letter of Consent

Prior to the interview the participants were introduced to the letter of consent. The letter noted to the participant that participation in the research was voluntary and that confidentially and anonymity will be ensured. It was also outlined that the interviews conducted will be recorded so that the data can be made available for later use.

3.4.2.3 Letter of Permission

Prior to any interviews taking place a letter of permission was obtained from the Business Unit's HR Department allowing consent to perform the research with employees within the Business Unit.

3.4.2.4 Conducting the Interview

Post the distribution of the Letter of Information and the Letter of Consent to the intended participants, a 60-minute session was set up in the diaries of the participants via a Microsoft Teams meeting link at the suggested availability and convenience of the participant. All intended participants for the study agreed to partake in the study and for a virtual interview to be conducted with them. Once again, prior to the interview, the researcher assured the participant that the interview was voluntary, and that the participant could withdraw at any time. The researcher also assured the participant that their confidentiality and anonymity would be guaranteed hence the interview question sheets do not contain the participant names.

During the interview demographic information questions were asked prior to the interview questions to establish the level of experience with Industry 4.0 related technologies and concepts. The interviews were semi-structured in nature which allowed the researcher to collect data and use additional probes to questions. The researcher used the semi-structured interview questions developed to guide the interview into the area of study and used probes to elicit in depth responses and expression of feelings and concerns. The open-ended questions and probes were designed to encourage the participant to interpret the questions themselves and decrease the risk of exploitation from the researcher. The researcher also took field notes during the interview and then compared it to the interviews once they were transcribed.

The interviews were recorded so that they could later be transcribed and used for data analysis. To ensure confidentiality is maintained, numerical codes were used to label the interview recordings instead of names (example: P1). The audio interviews, list of names of the participants and other supporting documentation were kept on a password protected computer to which only the researcher had access to. The data will be destroyed after the completion of the study and data write up.

3.5 DATA ANALYSIS

The aim of data analysis is to understand the various components of the study and the corresponding impact they have on each other. The data collected from the interviews was captured in Microsoft excel to interpret and analyze the data in order to draw conclusions and provide recommendations. Coding was used for this research. During qualitative data analysis this is an analytical process whereby concepts to the phenomenon are observed (Saldaña, 2015). Coding aims to develop concepts through describing and classifying the phenomenon under discussion. Data was segmented into meaningful expressions and described in a single word or short sequence of words. The relevant concepts were attached to these annotations by comparing the results to the theoretical framework discussed earlier.

Thematic content analysis was used using coding to analyze the qualitative data. This allowed for the data to be reviewed repeatedly through which recurring themes were identified and comparison then undertaken against literature. The commonly used recursive six-phase process by Braun & Clarke (2006) was used as outlined below:

1. Familiarization with the data collected and identifying items of potential interest.

2. **1st Level Coding:** Generating initial codes to identify important aspects of the data to address the critical research question by applying codes to datasets and collating codes across segments of the dataset.

3. **2nd Level Coding:** Developing categories and sub themes and searching for themes using the initial coding to identify broader patterns of meaning.

4. Reviewing sub-themes/themes by applying them to the dataset to address the critical research question. Themes can be redefined, combined, split, or discarded.

5. Defining the themes through developing detailed analysis of each theme.

6. Producing a report relating the analysis to existing literature.

The illustration below provides the high-level processes for the development of categories, sub-themes and themes from the coded data.

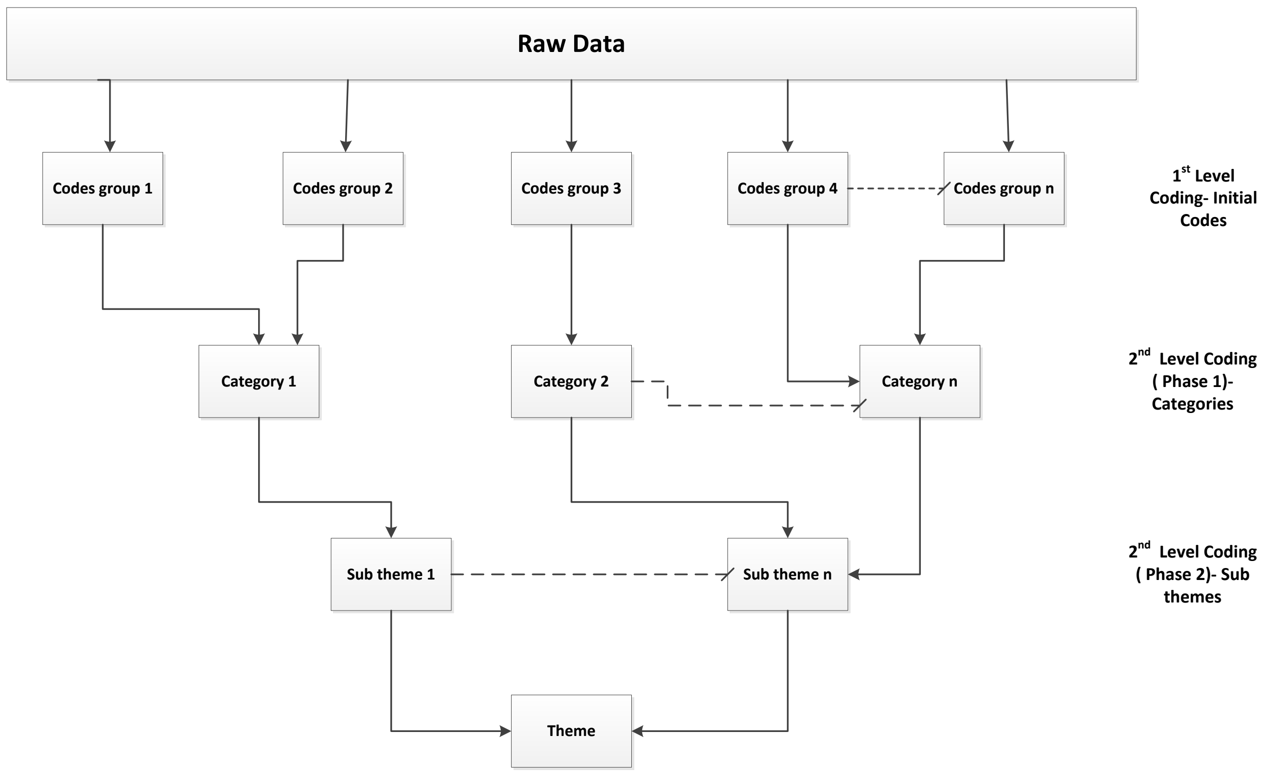

Figure 7: High level coding process

3.6 RELIABILITY

According to Golafshani (2003) validity and reliability are intertwined concepts. The more credible the research is the more dependability and reliability is placed in the research. This will lead to generalizability as a concept for a high-quality qualitative research. The aim of reliability is to ensure that the research procedure can be replicated to achieve the same results. This is done by making the research methods as explicit as possible as well documenting and displaying the evidence from the data collected from the interviews to ensure that the research process can be audited. Lincoln & Guba (1985) cited in Golafshani (2003) state that the terms reliability and validity in a qualitative study is a measure of quality that is related to trustworthiness of the research or poses the question “Can the findings be trusted?”. This was determined by the criteria of Credibility, Neutrality or Confirmability, Consistency or Dependability and Applicability or Transferability.

3.6.1 Credibility

Credibility is concerned with establishing the “truth value” and focuses on finding the accuracy in the research findings (Korstjens & Moser, 2018). Korstjens & Moser (2018) regards the strategies to ensure credibility in a qualitative study as prolonged engagement, persistent observation, triangulation, and member check.

Prolonged engagement means having a long-lasting engagement in the field with the participants in order to become familiar with the setting and context to build trust and test for misinformation (Korstjens & Moser, 2018). Being an employee within the particular Business Banking: Projects and Operations environment under study, the researcher had an understanding of the culture and environment from which the participants were drawn. Most respondents (87%) have experience in their current role of between 0 to 5 years. This was followed by 13% having an experience in the current job role of between 6 to 10 years. In general, the experience in the Business Banking environment by most respondents (75%) was between 6 to 10 years. This was followed by equally related experience of 12.5% in both the 0 to 5 year and 11 to 15-year category. This analysis further added to indicating prolonged engagement in the field. The researcher had already established working relationships with the participants prior to the interviews taking place hence the researcher was well informed of the data collected in its current environment.

Persistent observation is identifying the elements most relevant to the issue under study (Korstjens & Moser, 2018). Developing the codes and concepts helped examined the characteristics of the data. The researcher analyzed them and theorized them and analyzed concepts accordingly in the form of developing categories, sub-themes, and themes. It was a process of reading and re-reading the data to find the most appropriate themes and develop a final theory.

Triangulation is achieved through obtaining multiple sources of data and data collection (Korstjens & Moser, 2018). To this extent the researcher conducted interviews and also recorded field notes. The field notes were then compared to the transcribed interviews to establish more accurate conclusions. The researcher also collected data from multiple sources working in different areas of the Business Unit (Projects, Operations and IT) , outlined in Section 4.2, this allowed to gather data from a holistic perspective of the unit taking into account multiple experiences on the phenomenon to different groups of employees.

3.6.2 Transferability

Lincoln & Guba (1985) state that in qualitative studies, the researcher is not expected to provide an index of transferability, but it is the researcher's responsibility to provide the database that makes conclusions about transferability possible. The researcher has clearly described the process during data collection and the decisions undertaken and outlined the theoretical framework tested through analysis provided from the responses of the eight SMEs. The researcher has provided a thick description describing the context of experiences in analyzing responses so that conclusions can be drawn thus enabling the reader the ability to use the data and transfer the data.

3.6.3 Dependability

Dependability is achieved when researchers ensure that the research process is logical and clearly traceable (Tobin & Begley, 2004). Lincoln & Guba (1985) state that when researchers can examine the research process, they are better able to judge the dependability of the research which can be provided through an audit trail. To increase the dependability of the study the researcher has provided an audit trail of the methodology, interview transcripts, field notes and other activities throughout the study.

3.6.4 Confirmability

According to Korstjens & Moser (2018) Confirmability is the degree to which findings of the research study could be confirmed by other researchers. It is concerned with establishing that interpretation of the data is not as a result of the inquirer's imagination, but conclusions clearly drawn from the data. To this extent the researcher transcribed the data and the results were shared with the supervisor for verification.

3.7 VALIDITY

To prove validity the adherence to construct, internal and external validity was evaluated. Construct validity was used to show how inferences were made from the operationalizations in the study to the theoretical constructs on which they were based. Construct validity was ensured by using the conceptual framework to develop interview questions to which a comparison of the results was done to determine alignment to theory. Internal validity was ensured by looking at the demographic information of participants in relation to the experience in the current role and business unit. External validity was used to prove the generalizability of this study based on a small sample group of SMEs to which findings can form the basis for future research. This was ensured through selecting a sample that has significant experience with technology related projects such that their findings can be generalized to similar settings outside of the organization.

3.7.1 Construct Validity

The conceptual framework was used in this study to develop interview questions. Analysis of the responses from the eight SMEs resulted in the development of categories, sub-themes and themes in order to understand if the theory corresponds to the practical research. The finalized conceptual framework is outlined in Chapter 5 to prove construct validity of the research and understand conformance to theory and depict new concepts that emerged through the analysis of responses.

3.7.2 Internal Validity

Internal validity has to do with the degree to which a researcher is justified in concluding that an observed relationship is casual (Johnson, 1997). Johnson (1997) provides various strategies that can be used to prove validity in a qualitative study. For this study the researcher used 3 strategies to ensure that the research was valid in Triangulation, Participant Feedback and Reflexivity. Data triangulation was used to transcribe the responses from the experts by means of sourcing the data from both recorded interviews and field notes. This process was followed for each participant in the study to ensure a common approach is applied in collecting data from participants as well as analysing the data. The audit trail for this is provided in the appendix. Participant Feedback was undertaken with members within the research setting prior to conducting interviews with the selected participant. This was undertaken in the form of drafting the interview questions by reviewing them with members in the research setting so as to provide validity of the questions that was posed to the experts. The researcher developed initial codes and categories and continuously revised them in effort to eliminate potential biases by the researcher on the codes and categories developed. The validity of results in the current setting can also be trusted in terms of the number of years of experience of the selected participants withing the Business Banking Segment and within their role. 5 out of 8 participants also held management roles which provides familiarity in dealing with human resource policies and strategies and consequentially understanding the impact to the workforce.

3.7.3 External Validity

In terms of generalizability with reference to the sample selected, participants were selected such that they have numerous years of experience in working with technology related projects, operations, and concepts. The demographic information reveals that 50% of the selected sample had experience of between 16 to 20 years followed by the equal spilt of 0 to 5 years (25%) and 11 to 15 years (25%) experience. The participants selected also had several years of experience within the Business Banking Segment. To this extent it can be stated that the results can be generalized to other departments within the same organization in digital transformation within a projects and operations environment in a Business Banking setting. It can also be generalized to the Business Banking segment collectively within this particular bank. Since participants were only selected from a particular unit in a Business Banking : Projects and Operations environment in a particular bank, the results cannot be generalized to other segments such as Retail and Corporate within the particular bank as well as Business Banking : Projects and Operations environments in other banks.

3.7 ETHICAL ISSUES

Since this research involves data collection through interviews with experts, ethical clearance was required. This was applied for through the School Ethics Committee prior to any interviews taking place. The Participant Information Sheet and Letter of Consent was administered to the participants to inform them of the purpose of the study and outlining the terms and conditions of the study that they are agreeing to. A letter of permission from the Business Unit’s HR department was also obtained to conduct the research and submitted together with draft questionnaire in order to obtain ethical clearance. The ethical clearance number MIAEC 114/20 was granted.

CHAPTER 4

ANALYSIS AND RESULTS

4.1 INTRODUCTION

In this chapter the outcomes of the research study are presented. This is depicted through graphical data and an interpretation of the codes and categories developed. The data collected to perform the analysis and deduce outcomes were extracted from the interview responses of the eight subject matter experts (SMEs) within a Business Banking: Projects and Operations Unit. The analysis thereof was performed in Microsoft excel and discussed in this Chapter.

.

4.2 PROFILE OF THE SAMPLE

The sample consisted of eight SMEs selected from a Business Banking: Projects and Operations unit within a particular Bank. Within this unit there is a Projects, Operations, and IT space with 4 employees (50%) selected from the Projects space, 2 employees (25%) selected from the Operations space and 2 employees (25%) selected from the IT space.

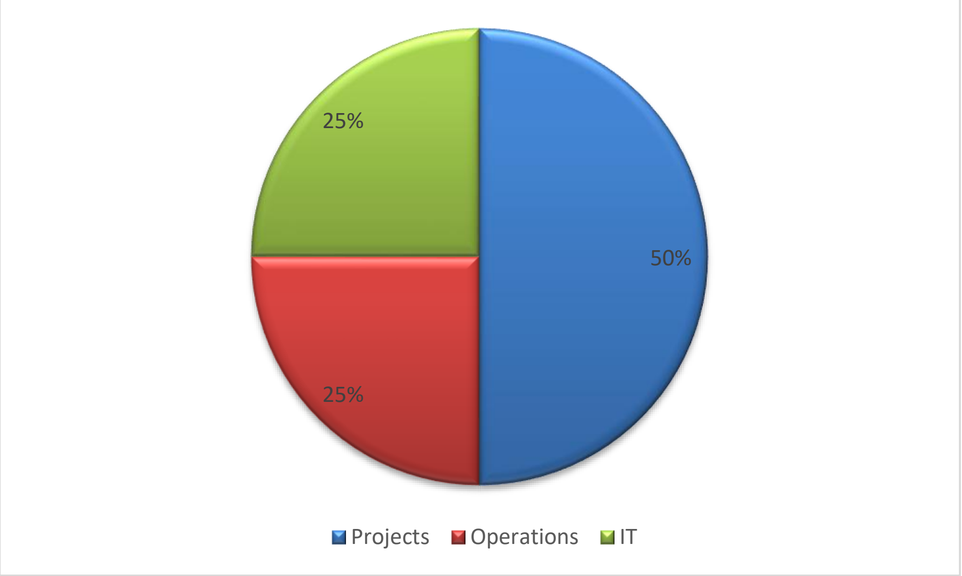

Figure 8: Participant's area of work

The below table indicates the job roles held within each space by the participants

Table 1: Segmentation of roles of participants

Area	**Job Role**	**Number of participants with role**	**Management Role (Yes/No?)**
Projects	Solution Strategist	1	Yes
	Solutions Head	1	Yes
	Solutions Architect	1	No
	Business Solutions Head	1	No
Operations	Fulfilment Operations Head	1	Yes
	Chief Operating Officer	1	Yes
IT	IT Operations Head	1	No
	Chief Information Officer	1	Yes

Regarding the years of service in the current role, 7 out of 8 employees (87%) have been in their current role for between 0 to 5 years. The remaining employee (13%) has a job role related experience of between 6 to 10 years.

The years of experience in the current role is depicted below

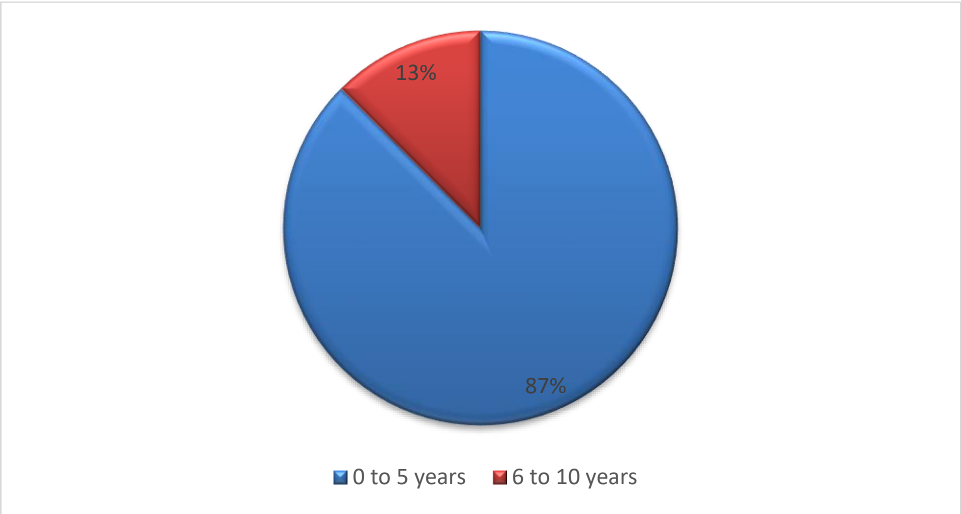

Figure 9: Years of experience in current role

Most employees (75%) have an experience of between 6 to 10 years in a Business Banking environment. This is followed by equally related experience of 12.5% in both the 0 to 5 year and 11 to 15-year category.

The number of years of experience in a Business Banking space is shown below

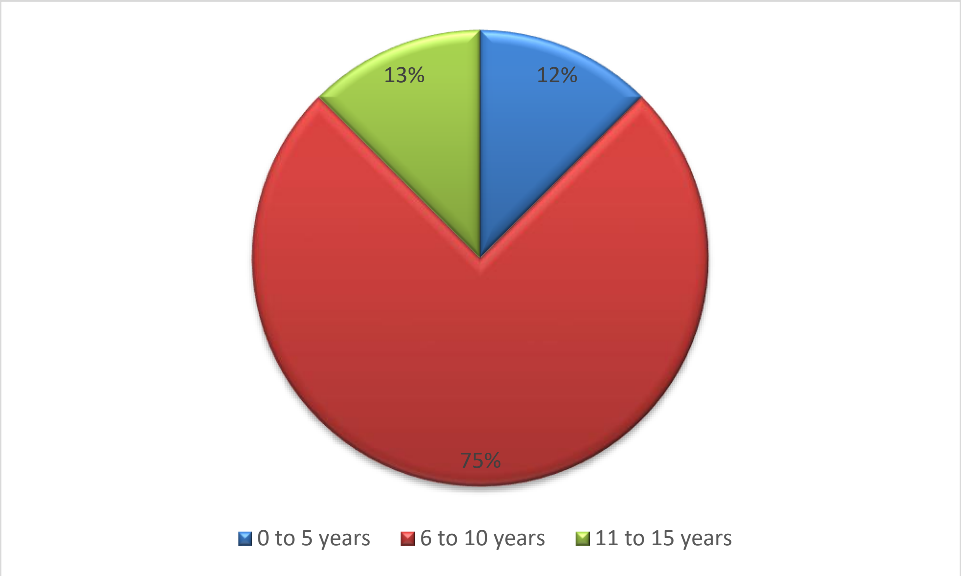

Figure 10: Years of experience *in business banking*

Half of the sample (50%) has experience of between 16 to 20 years with technology related projects and concepts in a banking space. This is followed by the equal spilt of 0 to 5 years (25%) and 11 to 15 years (25%) experience. There are no employees (0%) with an experience less than 5 years in working with technology driven projects.

The number of years of experience with technology related concepts and projects is depicted below

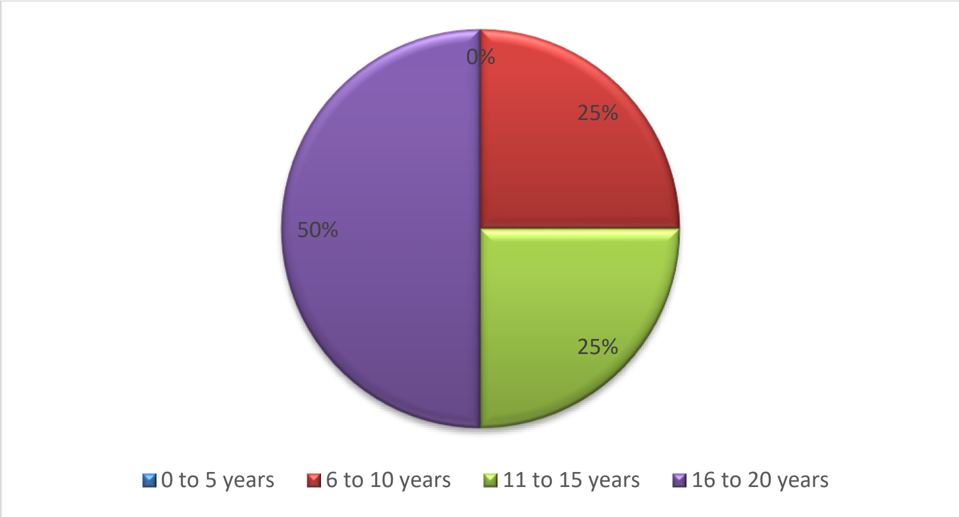

Figure 11: Years of experience with technology related projects

4.3 FINDINGS OF THE THEMATIC ANALYSIS

In this subsection the analysis of the interview transcripts resulting in sub themes and themes is discussed. The analysis resulted in the development of 6 themes, 14 sub-themes and 66 categories.

4.3.1 Thematic Category 1

Thematic Category 1 discusses the analysis for interview questions number 1 to 4
The below diagram illustrates the process for arriving at themes for Thematic Category 1.

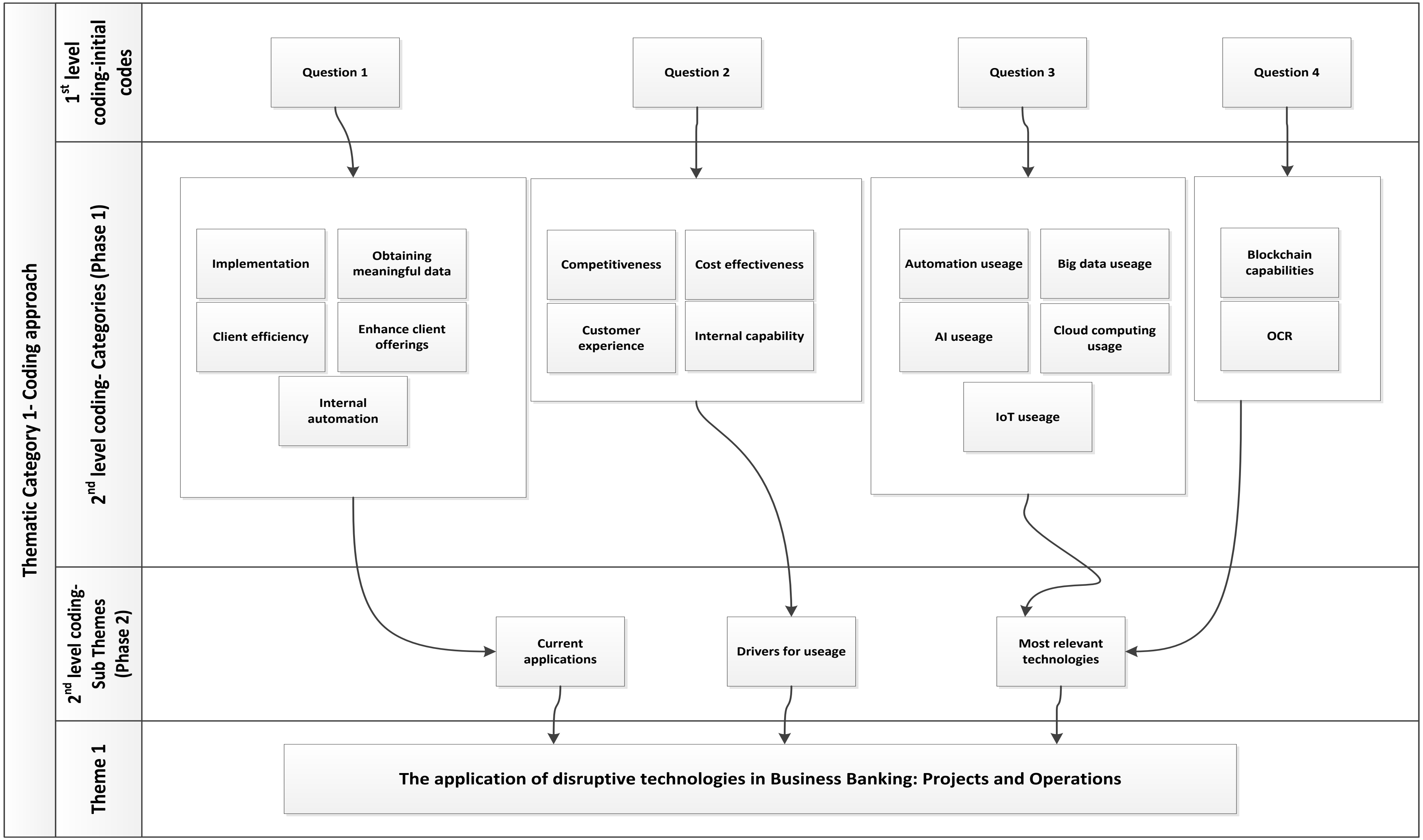

Figure 12: Coding for Theme 1

4.3.1.1 Theme 1 - The application of disruptive technologies in Business Banking: Projects and Operations

This theme analysed the application of disruptive technologies in the business unit. It was important to understand the current use of technology and to what extent it was used to provide a background for the business unit and what factors were most relevant to the business unit. Three sub themes emerged: Current Applications, Drivers for Usage and Most Relevant Technologies which is analysed below.

Sub Theme 1 - Current Applications

This sub theme concerns the current applications for disruptive technologies within the unit as well as the maturity of implementation of these technologies.

The below chart depicts the number of respondents that agreed with each of the current applications of disruptive technologies

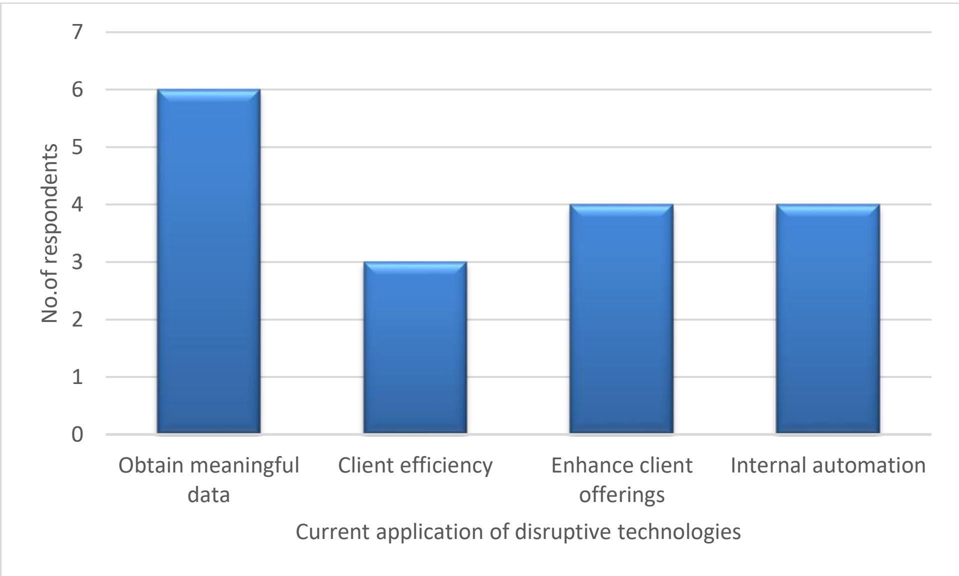

Figure 13: Applications of disruptive technologies

Respondents 1,2,3,5,6 and 7 stated that the unit uses disruptive technologies to obtain meaningful data from the customer to improve both customer offerings and internal processes. Respondents 1,2 and 7 looked at the use of disruptive technologies also to provide customer efficiency. This was in terms of providing real time solutions. Respondents 2,5,6 and 7 stated that disruptive technologies were used via client facing elements such as App and Online Banking so that the unit can position products effectively. Respondents 4,5,6 and 7 agreed that technologies were used to enhance internal processes.

Viewing the application of disruptive technologies in terms of maturity, the chart below indicates the level of maturity of disruptive technologies in the current unit. 62% of respondents agreed that the maturity of implementation was high. This was followed by 25% of respondents viewing the implementation maturity as low and lastly 13% of respondents saw it as moderate with still some way to go until the entire value chain consists of digitized solutions.

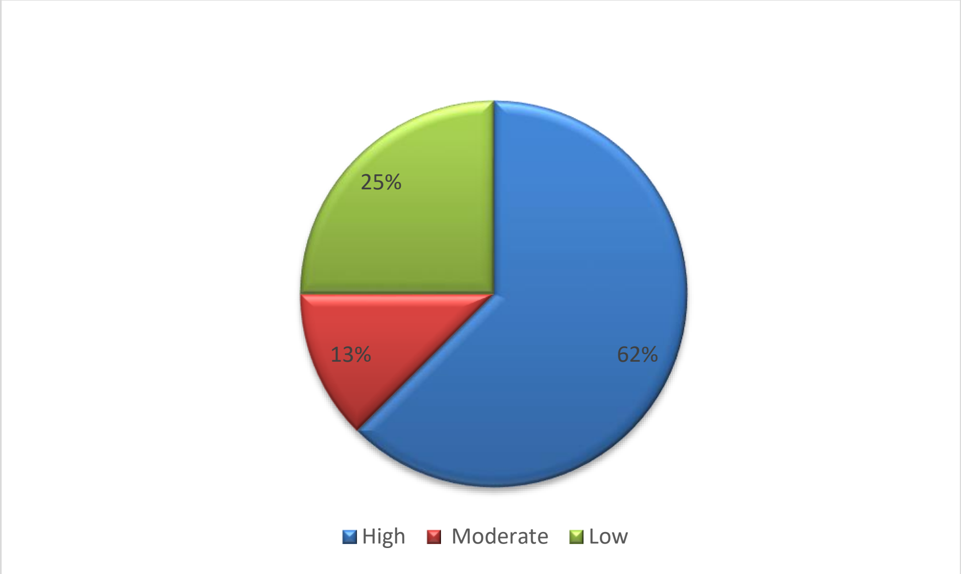

Figure 14: Maturity of implementation of disruptive technologies

Respondents 2,6 and 7 referred to maturity of implementation of disruptive technologies in that the unit was well advanced in implementation especially with client facing elements such as digital solutions via online and app channels. Respondents 4 and 5 also agreed with this however they believe that the unit was more mature in terms of being on an automation journey rather than implementing newer technologies with Respondent 4 stating that outside of automation, implementation of other disruptive technologies was limited due to the unit not upgrading underlying systems. Respondents 1,3 and 8 have a different perspective on maturity that was more from an internal perspective rather than client facing. They agreed that although disruptive technologies are being applied from a client facing point of view, back-end processes were still in the process of being transformed to make use of these technologies which made usage of disruptive technologies low to moderate

Sub Theme 2- Drivers for usage

This sub theme concerns the importance of embracing disruptive technologies within the unit and ultimately the drivers for why the unit must go through change to incorporate disruptive solutions in its environment.

All Respondents stated that it was critical to embrace disruptive technologies to remain competitive. Respondent 4 referred to not only competing locally but also internationally and with fintech companies. Respondent 8 was weary of the challenge from smaller banks who were adopting technologies aggressively in the current time while larger banks needed to upgrade technology to be competitive.

Respondents 5,6,7 agreed that the use of disruptive technologies in the unit was also driven by the need to minimise cost and maximise income. In terms of the cost to income ratio it was improved with disruptive technologies due to operational processes being automated which required less staff. Respondent 6 stated that initially there would not be a high return on investment, but it was a journey with disruptive technologies rather than an immediate maximizing of income.

Respondents 1,2,3,8 stated that it was important to use disruptive technologies to improve customer experience with the solutions provided. They all agreed that this provided the ability to retain the existing customer base while also tapping into new markets and customers.

Respondents 1,2,3,5 and 6 agreed that embracing disruptive technologies was because of perusing internal business unit benefits. Respondents 1 ,3 and 5 stated that disruptive technologies allowed for internal process improvement in the form of using automation to assist with key functions and using data to continuously improve processes and decisions. Respondents 2 and 6 spoke to internal capability of the workforce being enhanced with Respondent 2 recognizing that if disruptive technologies are not embraced there was potential for the bank to not retain skilled workforce who want to work on new technologies.

Sub Theme 3- Most Relevant technologies

Within this sub theme analysis was done to determine which are the most relevant technologies influencing the current business unit’s day to day operations. The responses are discussed below.

All respondents agreed that automation plays a key role in the current business unit. Respondent 8 recognized automation as critical for being a driver in removing manual work. Respondents 1 to 7 agreed that automation in the current environment is used to automate decisions and provide quicker credit evaluation for the customer with auto renewals of facilities. Respondent 2 stated the entire value chain within the unit was almost fully automated such that there was little to no interaction by staff from internal processes to client facing elements.

Most of the respondents agreed that the use of big data analytics was important in the business unit. They stated that it was critical to understand customer needs and from this data be able to predict what a client needs and offer it to them via online and app capabilities.

The Business Unit also employs AI concepts through machine learning in which predictive models are built to assist the customer from a credit perspective according to Respondents 2,3,5 and 6. AI is however only as a result of having structured data and automation functions as recognized by Respondent 3.

Respondents 3,4 and 7 agreed that cloud computing is a relatively new concept in a projects and operations space. According to Respondent 7 the use of this technology was restricted for a long time due to regulations surrounding data sharing. Contrary to this Respondents 6 and 8 agreed that cloud computing was extremely important from an IT perspective and that is was being used to a great degree to assist with automated testing and storage.

All Respondents agreed that currently the unit does not employ IoT concepts as there is no drive towards it from a Business Banking perspective.

Using the responses above, a score for each technology was determined with the usage categorized by the following scores: High usage= 5, Average usage =3, Low usage= 1, No usage = 0. The scores for each technology discussed was summed up across all Respondents and an average score calculated to depict a level of usage as shown below. It is seen that automation is used to a high degree, which is followed by big data analytics with a usage being above average. AI is seen to be used to an average degree with cloud computing being used to just above a low degree as a result of the usage in the IT space. Lastly IoT depicts no usage at all as outlined by the responses provided.

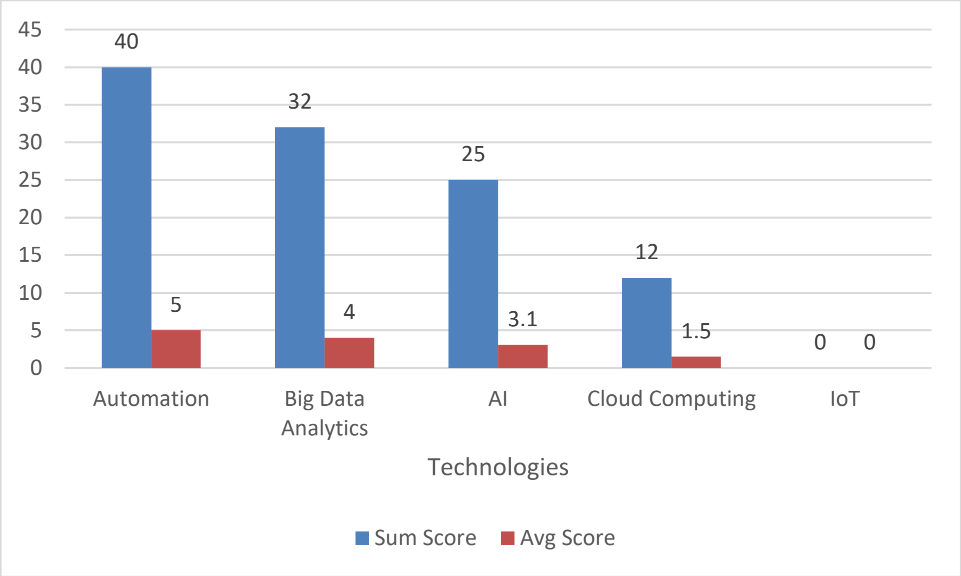

Figure 15:Most used technologies

4.3.2 Thematic Category 2

Thematic Category 2 the analysis for interview questions number 5 and 6.

The below diagram illustrates the process for arriving at themes for Thematic Category 2.

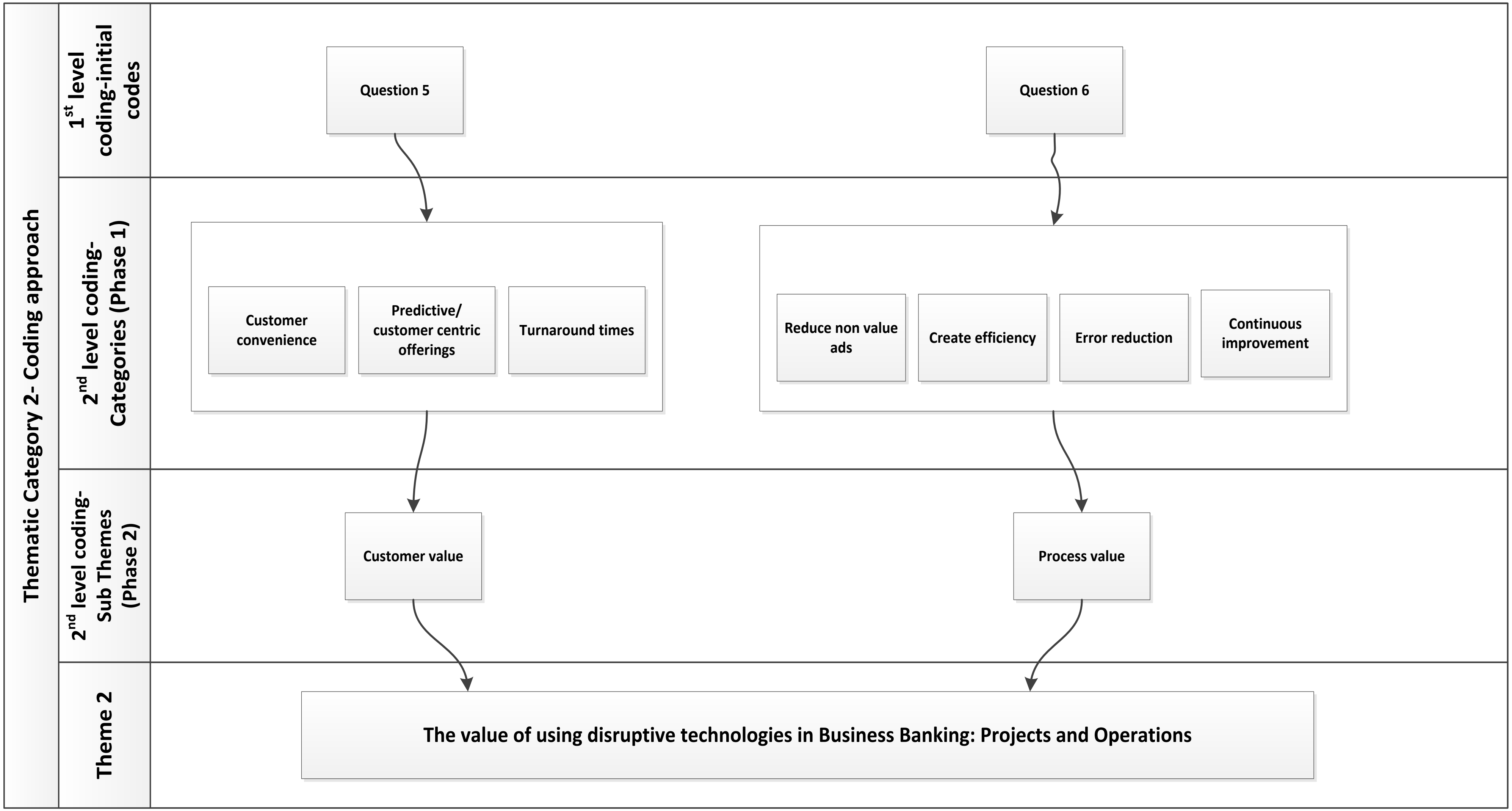

Figure 16: Coding for Theme 2

4.3.2.1 Theme 2 - The value of disruptive technologies in Business Banking: Projects and Operations

This theme particularly relates to the value adding impact of disruptive technologies in the business unit from both an internal and external perspective. It is ultimately the changes in the back office that serves a particular client need such as improved turnaround times or less risk. It was necessary to understand this to realize what the business unit seeks to achieve by using disruptive technologies. In this theme the reasons for making use of disruptive technologies is analysed resulting in two sub themes of Customer Value and Process Value discussed below.

Sub Theme 4 – Customer Value

This sub themes analysed the reasons for using disruptive technologies in the business unit from a client facing perspective.

Respondents 1,2,3, 4 and 8 agreed that value is created for the customer by creating customer convenience. Respondents 3 and 8 stated that customer convenience was achieved through digital offerings and digital platforms. Having highly integrated processes and systems allowed for the ability for all products and services to be available on the same platform according to these respondents. This created the value add of convenience and a smoother customer experience.

Customer centric solutions was seen to be a key value add of using disruptive technologies according to Respondents 1,2,4,5,6 and 7. Respondents agreed that data was obtained from customer behaviour in order to make offerings to the client based on the products that they needed. It helped to make better decisions for the customer.

Respondents 2,4,5,6 and 8 ultimately agreed that turnaround times are improved by using concepts of automation to offer solutions quicker to customers.

Sub Theme 5- Process value

The value additions within processes to the business unit is analysed in this sub theme.

Manual work within processes is non-value adding with employees wasting time on effort on functions that can be automated. Respondents 1,2,3,5,6 and 8 agreed that with disruptive technologies manual work is eliminated. Respondent 1 referred to real time interfaces and cutting out the middleman between processes and therefore eliminating non-value adding tasks.

Respondent 8 stated that with the use of disruptive technologies there was the concept of reuse of data which allows less wastage of time in fetching data multiple times which ultimately improves turnaround times. Respondents 2,3,4,5,6 and 7 also agreed that efficiency was created with the use of disruptive technologies by shortening the time taken to perform tasks. Respondent 2 stated that this was down to the process being intuitive by building intelligence into systems that can react accordingly. Respondent 5 stated further that the value add in processes was achieved particularly through automation to improve time and accuracy.

Respondent 7 stated that disruptive technologies in processes adds to the quality output as there is less manual effort and therefore less errors in the process. Respondent 5 also agreed with this by stating that there were less assumptions made in processes. Respondent 4 agreed with the concept by stating there will be less inherit risk in systems and processes.

Respondent 2 and 3 agreed that due to the availability of data from processes, it allows for continuous improvement. Respondent 2 stated that with the data available from processes the unit is able to track user experiences on systems and make improvements due to user frustrations. Respondent 3 also stated that digital processes now allow access to more data that was never available before and the data can be used to make process enhancements.

4.3.3 Thematic Category 3

Thematic Category 3 discusses the analysis for interview questions number 7 to 12.

The below diagram illustrates the process for arriving at themes for Thematic Category 3.

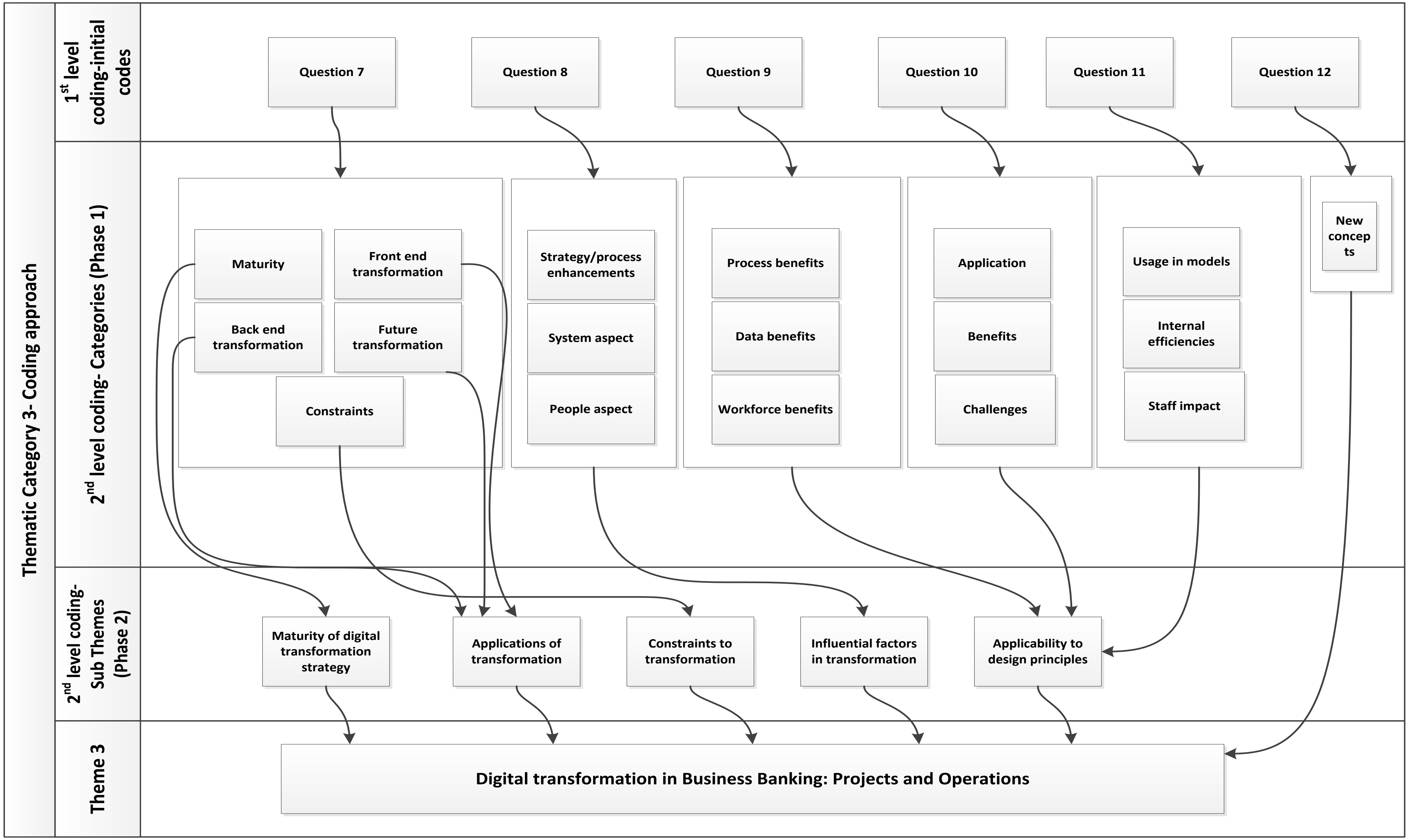

Figure 17: Coding for Theme 3

4.3.3.1 Theme 3 - Digital Transformation in Business Banking: Projects and Operations

An organization striving to succeed in an Industry 4.0 world is bound to go through digital transformation. The business unit has been on the digital transformation journey for over 5 years. It is important to understand the concepts of transformation influencing the current business unit to provide background to the transformation changes that impact the workforce. Five sub themes emerged from the analysis seeking to analyse and give context to the broader theme. These sub themes are: Maturity of digital transformation strategy, Application of transformation, Constraints to transformation, Influential factors for transformation and Applicability to design principles.

Sub Theme 6 – Maturity of digital transformation strategy

In this sub theme analysis was undertaken to understand how mature the unit’s digital transformation strategy was in terms of digitizing current processes and operations.

Respondents 2 and 3 agreed that the digital transformation strategy of the unit was mature. Both these respondents believed that the unit understands where they want to be with respondent 2 viewing maturity as advanced by stating there was little manual effort involved in processes.

Respondents 1,4,6,7 and 8 also agreed that the strategy was mature however current implementation of the strategy was slow which was why they viewed digital transformation in the unit as moderate. Respondent 6 stated that the unit is in the stage of now moving on to digitize more complex functions. Respondents 4,7 and 8 stated that transformation was hindered by constraining factors from a process and system perspective.

Respondent 5 stated that transformation was at its infancy in the unit by stating that transformation had been done mostly from an operational perspective and believes there is still much to do in terms of transforming the entire value chain.

The below chart depicts that 62% of respondents viewed maturity of the digital transformation strategy in the unit as Moderate. This is followed by 25% of respondents stating that the unit was well on their way in terms of applying its digital transformation strategy across Projects, Operations, and IT areas. Lastly 13% of respondents stated that the maturity of the strategy was low with the unit only beginning to transform current processes and operations.

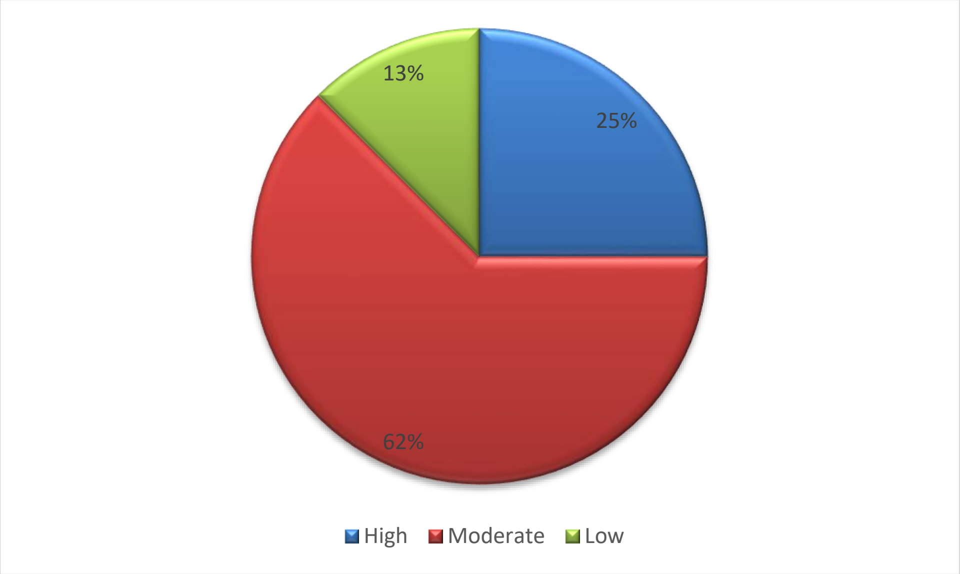

Figure 18: Digital Transformation Maturity

Sub Theme 7 - Applications of Transformation

Various ways in which the business unit applies digital transformation is analysed in this sub theme and gives an indication of the level of transformation the business unit is at currently and where it would like to be in the future.

The unit is well advanced in providing digital solutions to customers via front end channels according to Respondents 1 and 2. Respondent 2 attested to this by stating that from a front end customer element perspective most offerings have been digitized and the unit was now moving on to digitizing the remaining services. Respondent 4 stated that although some products and services are digitized, the unit was still not doing enough for customers with the focus only being on retaining the existing customer base and not catering for new customers.

Respondents 1,2,3,5,6 and 7 looked at the usage of digital transformation from a back-office point of view. Respondents 1 and 6 agreed that the unit was moving towards data strategies with Respondent 7 stating that the unit was well transformed from the previous service architecture to now a data driven architecture. Respondents 2 and 3 spoke to a very similar concept of digitization in that the unit was building on platforms and focusing on consolidating systems to be more efficient and allow for standardization. Respondents 5 and 6 agreed that the unit was using automation to a great degree in digitally transforming routine tasks.

Respondents 4,5 and 6 agreed on the future state of transformation for the unit in that more needs to be done in digitizing complex functions which allows for both internal efficiencies and creates value for the client.

Sub Theme 8 - Constraints to Transformation

This sub theme analysed the limiting factors to digital transformation in the business unit.

Respondents 3 and 8 agreed that the usage of old architecture and legacy systems constrain digital transformation. Digital transformation was also constrained in the unit due to the complexity of the business processes according to Respondents 3 and 7. Respondent 2 stated that staff needed to be more involved in transformation and saw the human aspect of the unit as a constraint to digital transformation.

Sub Theme 9 - Influential Factors in Transformation

In this sub theme various factors that influence transformation were analysed to understand the potential changes that were required for the business unit.

Respondents 1 and 8 agreed that to speed up digital transformation the unit needed to decrease its dependence on older systems and architecture. Due to this dependence, it was difficult to transform systems according to Respondent 8 thus giving smaller banks an advantage as they do not have legacy systems.

Respondents 2,3,4 and 6 agreed that the skills within the workforce in the unit needed to be broadened. Respondent 4 and 2 stated that a fresh skillset was required which may entail employing people from outside the bank to have a new approach on digital transformation in order to speed it up. Respondent 3 stated that the existing skillset among workers needed to be improved. Respondents 3 and 5 agreed that the unit required specialist teams to work with digital transformation concepts and find new ways of doing things. To speed up and adapt to transformation in a changing environment Respondents 1,5 and 6 agreed that it was difficult for employees to understand new concepts and technologies as the change management process was slow.

From a strategy point of view Respondents 1 and 8 agreed that there needed to be a shift in prioritizing digitization projects and getting more projects on the same platform and architecture. Similar to this, respondents 4 and 5 stated that the unit needed to move on quicker to data architectures. Respondent 6 believed the processes in the unit was too complex which hindered the ability to transform due to complex tasks and business processes. Respondent 4 stated that the unit needed to be more open to embracing fintech solutions and outsourcing skill and resources for complex automation and AI functions in order to speed up transformation. Respondent 3 agreed with this by stating that the unit needed to partner with the right organizations in order to obtain data and perform analysis on it.

Sub Theme 10 - Applicability to Design Principles

The applicability to Industry 4.0 design principles of integrated processes or interoperability, flexibility and adaptability and automated decision making is analysed in this sub theme to determine how advanced is the business unit in applying these principles.

Based on analysis of responses all respondents agreed that the unit currently has strong integrated processes and systems which was largely accomplished by the drive to automate tasks.

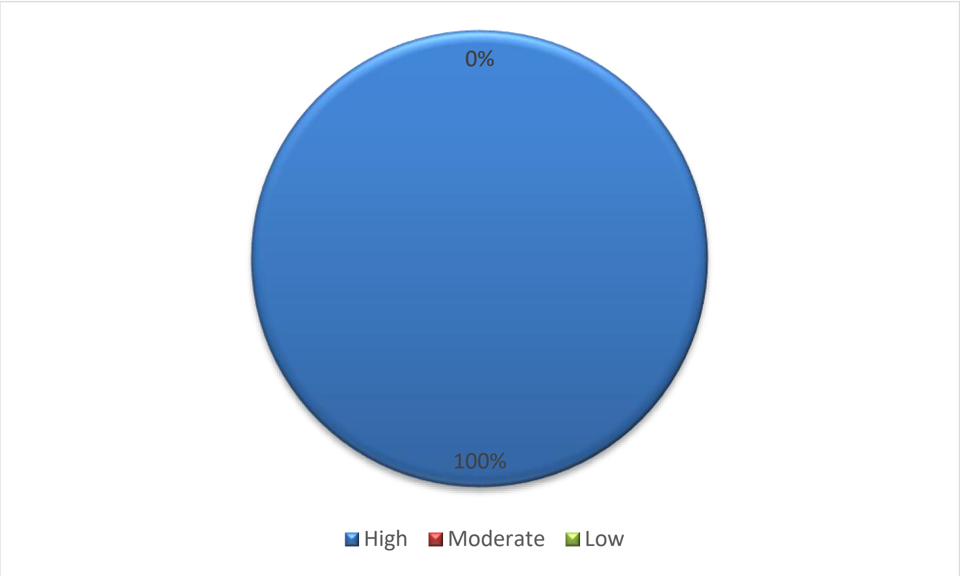

Figure 19: Usage of Interoperable concepts

With interconnected processes and systems Respondents 1,3,5 and 6 agreed that it created less handover points of data. According to Respondent 6 this was previously non-existent and there were many handover points of data creating inefficiencies from a process point of view. Respondent 5 stated that with integrated processes there was a reliance on data lineage that gave the ability to track data over time. Respondents 4,6 and 8 saw the key benefit as the availability of data from an interconnected architecture and this was previously data that was not useable.

Respondents 2 and 4 agreed on a similar concept of standardization through integrated processes. Integration allows for a fully automated process and standardization. Due to less handover points Respondents 1,4 ,7 and 8 agreed that benefits are realized in turnaround times. Respondents 3,5 and 7 stated that there was less risk and error involved in processes and systems. The availability of data also allows for inefficiencies to be tracked with Respondent 6 stating that blockers in the process can be identified and further inefficiencies optimized. Respondent 4 also agreed with this concept.

Respondents 2 and 7 stated that pressure on the workforce was alleviated through integrated processes as there was less manual work needed between processes and systems. Respondent 2 stated that this could allow staff to be repurposed to perform higher value functions. Respondent 8 also agreed with this by stating that there would be less staff doing the same thing.

The illustration below indicates the degree to which flexible and adaptable processes are used. Analysis was performed based on the responses with a level of high, moderate, and low usage associated to each response. More than more than half of the respondents (63%) believe that the current use of flexible and adaptable concepts is used to a moderate degree. This is followed by 25% of respondents agreeing that it was used to a low degree and lastly 12% of respondents agreeing that it was used to a high degree.

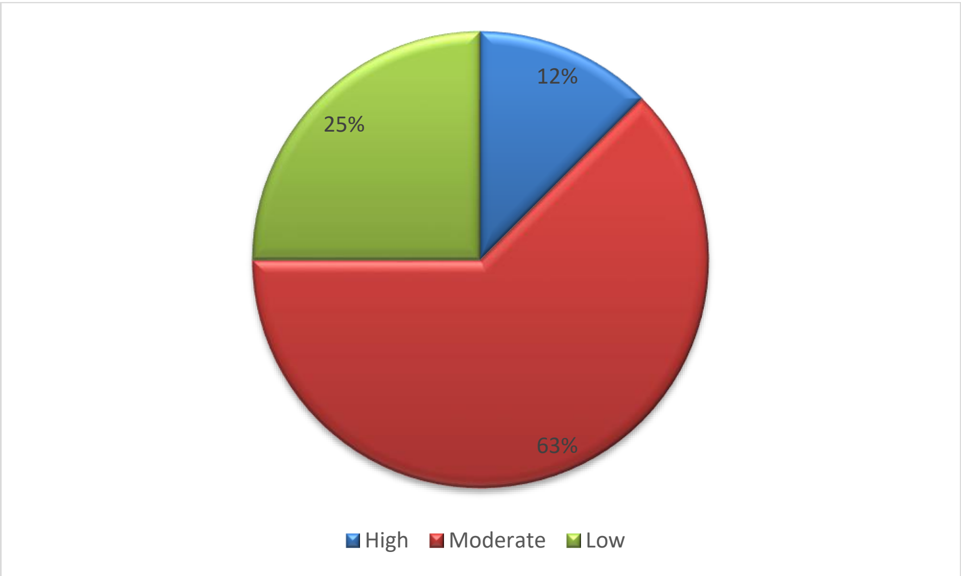

Figure 20: Usage of Flexibility and Adaptability Concepts

Respondents 2,3,4,5 and 8 viewed the application of flexible and adaptable processes and concepts as moderate in the current environment. Respondent 3 stated that in recent times the unit has been able to adapt more to industry crisis by having both systems and processes that are flexible. Respondent 4 agreed with this statement from a process point of view however believes the business unit is lacking when it comes to employees and teams being flexible and changing the way they work. Respondent 2 and 5 stated that the business unit was flexible in some but not all processes and systems with Respondent 2 making reference to the design of platform based solutions that are assisted (involve manual input) and unassisted (does not involve manual input) that adds to this concept. Respondent 6 and 7 agreed that the business unit is only at the infancy of implementing flexible and concepts and state the unit is not very advanced in it with still some way to go. Respondent 7 saw more value in building processes that are modular rather than flexible and adaptable. Respondent 5 disagrees by stating that the business unit employs concepts of reuse to a great degree which speaks to flexibility and adaptability. The respondent further stated that the business unit standardizes as much as possible to allow future builds from a system architecture point of view to be done quickly and easily.

Respondents 1,2,5 and 8 also spoke to the benefits of flexible and adaptable concepts. Respondents 2 and 8 spoke to a similar concept in that it allowed for development of new products based on client specific needs as processes and systems allow proactive engagement with the client. Respondent 1 stated that it allows for reuse and standardization while Respondent 5 referred to the ability to react to risk and use automation to respond to crisis.

Respondent 6 and 7 stated that the concept is still new due to the challenges around of implementation. Respondent 6 stated that the unit cannot be as flexible and adaptable as they want to be as the banking industry was highly regulated to ensure that specific standards were met and that the business unit was still having difficulty in understanding the data available to make the best use out of it. Respondent 7 stated that the business unit was still tied into legacy systems and it was difficult to transform and break away from it due to the complex functions that they currently handle.

Most respondents agreed that automated decision making was used to a great degree in the business unit. It was used in scorecards in order to evaluate customers for credit, in pre-approval decisions for credit and automated decisioning was built into the models existing in the unit providing decisions. Respondent 2 stated that automated decisions were used within systems to provide risk warnings to detect fraud. Respondent 7 agreed with this by stating that data is collected, and a decision made to provide early warning triggers in a loan application process.

Based on the analysis of responses 62% of respondents stated that automated decision making is used to a high degree in the unit. This was followed by 38% of respondents stating that it was used to a moderate extent.

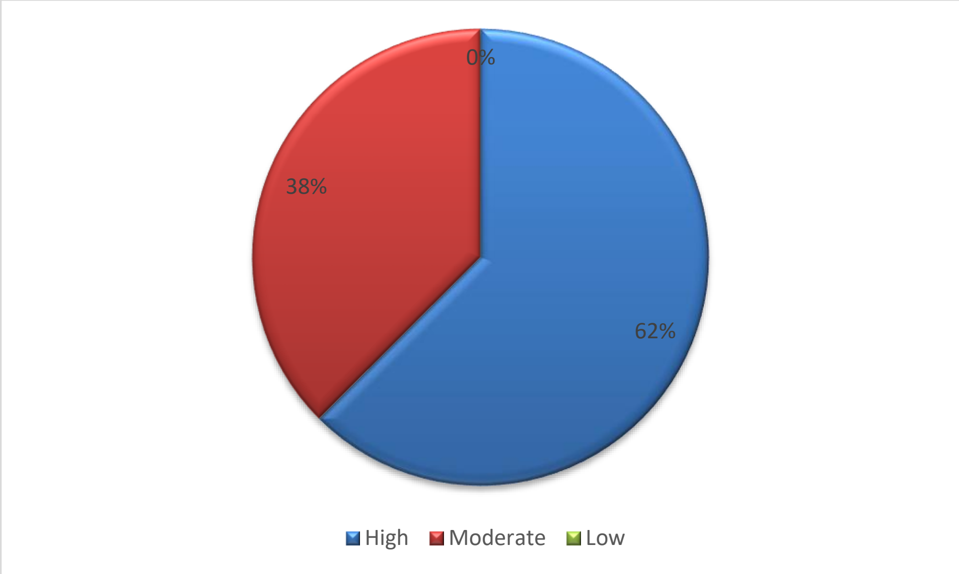

Figure 21: Usage of Automated Decision-Making Concepts

Respondent 4 stated that automated decisioning within systems and processes allowed for reduction in manual work and for only higher order decisions to be referred which in turn frees up capacity. Respondents 3,5,6 and 7 agreed that automated decisions reduced the amount of staff needed in this unit to perform judgemental decisions. Respondent 2 stated that automated decisions was important as it also provided further input to staff in order for them to perform their tasks more accurately when it comes to making decisions.

The reduction in manual intervention leads to more consistent and trusted decisions being made according to Respondents 3,4 and 8. Respondents 5 and 8 stated that this ultimately leads to less error in the unit. Respondents 5 and 7 agreed that automated decisioning making added value by saving time due to less handover points for decisions

4.3.4 Thematic Category 4

Thematic Category 4 discusses the analysis for interview questions number 13 to 18.

The below diagram illustrates the process for arriving at themes for Thematic Category 4.

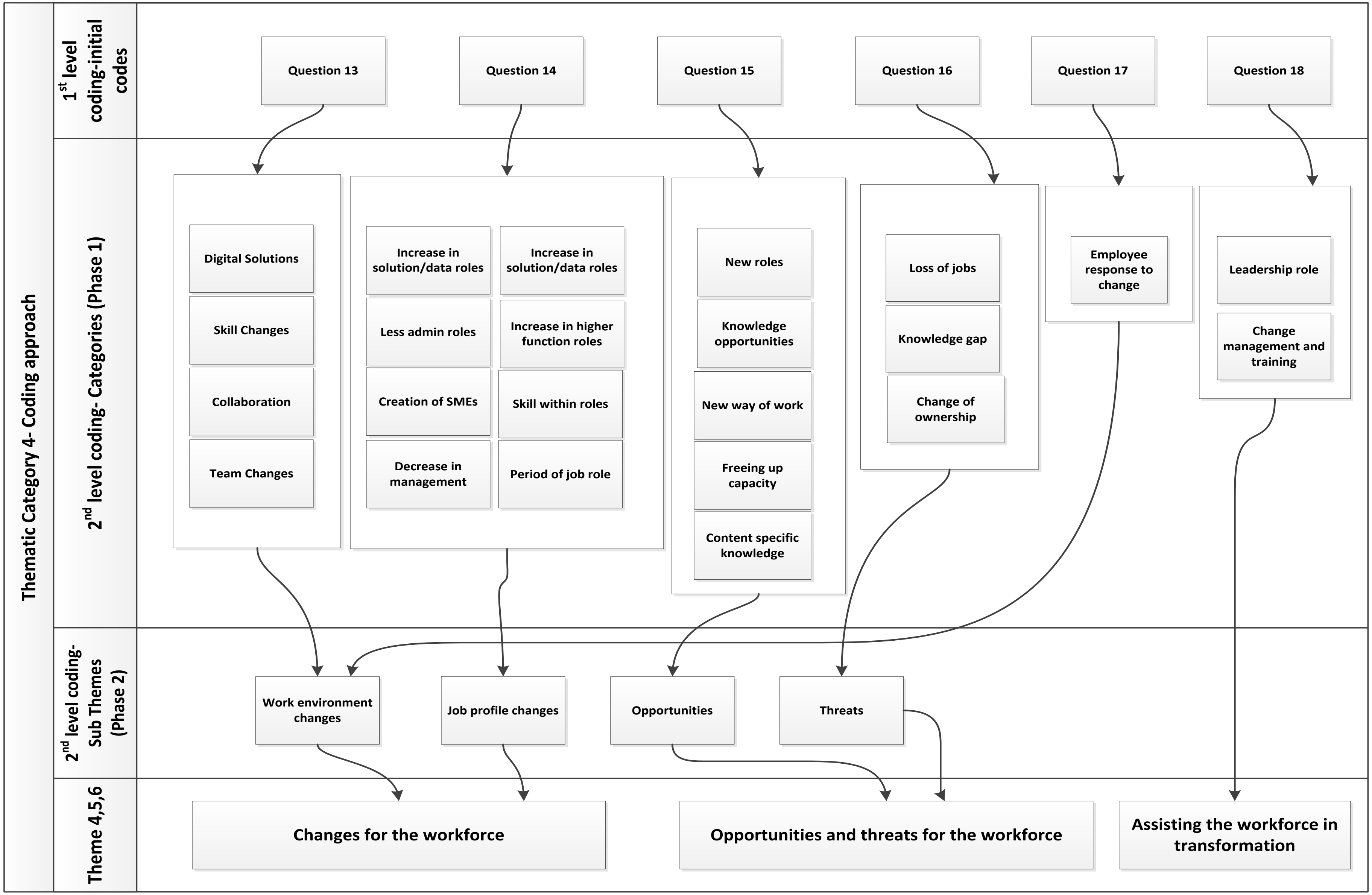

Figure 22: Coding for Theme 4,5 and 6

4.3.4.1 Theme 4 - Changes for the workforce

This theme looked at the changes to the workforce with two sub themes in Workforce Environment Changes and Job Profile Changes. With this theme an understanding of the working environment in an Industry 4.0 world was discussed and the expectancy of employees to thrive in such an environment. Specific job profile changes were also analysed and discussed to determine the overall impact in terms of creation or loss of jobs for the business unit based on the respondent's experiences.

Sub Theme 11 - Work environment changes

This sub theme analysed the changes to the working environment because of digital transformation in the business unit which is namely: Digital Solutions, Collaboration, Skill Changes and Team Changes.

Respondents 1,2, and 3 agreed that with digital transformation there was a digital behaviour being driven in day to day tasks. Respondent 1 stated that it has provided more freedom to the employee in terms of being able to perform their daily tasks remotely and boosted productivity. Respondent 2 saw digital behaviour being driven in the unit by the policy to not have printers in the working environment encouraging employees to switch from paper-based operations to digital solutions. Respondent 3 stated that due to availability of data the unit could track inefficiencies and build digital workers to improve turnaround times.

Respondents 1 and 2 agreed that with transformation came increased collaboration and gave the ability for employees to work more closely together across departments with the availability of shared data sources.

Respondents 2,3,4,5,6 and 7 referred to a change in the working environment in terms of the skill required. Respondent 2 stated that the unit was actively employing a younger qualified workforce with updated skills on technology and a new perspective of performing tasks. Respondent 3 stated that the working environment included a culture of employees wanting to upskill themselves. Respondent 4 stated that with digital transformation there was a change to the working environment in terms of outsourcing skills for complex functions and bringing in a fresh mindset to the unit. Respondent 5 agreed with Respondent 2 in that the working environment is constantly looking for new skills to keep it updated. Respondent 6 stated that with the new skills in the working environment comes the universal understanding of data by employees from low skilled to higher skilled workforce. Respondent 7 had a slightly different view and states that because employees in the working environment are now required to be multi skilled in both non digital and digital solutions it created a stressful environment that ultimately was hesitant of change.

Respondent 4 saw that the working environment contained specialist teams with the mandate of exploring new digital solutions. Respondent 5 agreed with this by saying the working environment now has a growth of the size of a team that works with automation or other technology-based project and that there was a decrease in the size of teams that were administrative.

The below graph summarized the number of respondents that agree with the types of changes to the working environment.

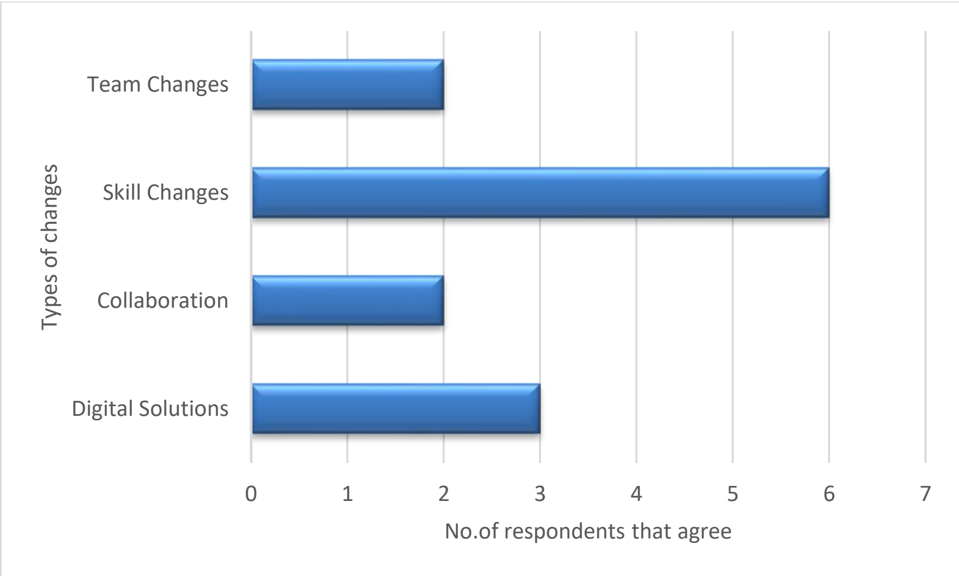

Figure 23: Changes to the Working Environment

Respondents were also posed a question in which they were asked how they see employees adapting to such changes. Respondent 8 felt that most employees are not adapting to change and are hesitant to change because transformation takes away extra working tasks. In the IT space employees get paid for working beyond standard working hours and according to Respondent 8 this was the main reason why the IT workforce does not take change in the business unit as a positive because of the added income it takes away through automation of tasks. Respondent 2 and 3 agreed with the employees being hesitant about digital transformation particularly the mature workforce according to Respondent 2 who stated that the introduction of new technologies also brings about fear of the unknown for the mature workforce. Respondent 4 saw that back-office staff are able to adapt and are used to accepting change more regularly than front line staff who are struggling to cope with the changes introduced to customer facing elements. Respondents 5 and 7 saw a different view as compared to the responses discussed, with Respondent 7 stating that there was eagerness from the workforce in understanding new concepts. Respondent 5 stated that respondents accepted change without question because they have come to realize that the change within the business unit was inevitable and they can either adapt, or not upskill themselves with the risk of losing their job.

Sub Theme 12 - Job profile changes

This sub theme analysed the specific changes to job profiles as a result of digital transformation.

Respondents 1,3,4,5,6 and 7 agreed that job profiles in solution or data-based roles have increased. Existing employees are being transformed to become a problem solver and understand data.

Respondents 1,2,3 and 8 agreed that with digital transformation there was less repetitive tasks within roles and consequentially a decrease in roles that are administrative based as Respondent 8 stated that the functions of these job roles could be easily automated.

Respondents 3 and 8 stated that employees with the specific know how of business operations would be transformed into SMEs and would be valuable to the workforce in terms of understanding content specific work.

Respondent 2 stated that job profiles would change in such a way that an employee can be repurposed to perform higher order tasks once mundane tasks are automated. Respondent 4 agreed with this. Respondent 5 agreed with the concept by stating that from an employment point of view the job profiles that needed to be filled was to understand complex functions and perform business tasks such as chartered accountants and actuaries. Respondent 7 saw changes to job profiles performed by highly skilled workers who make decisions.

Respondents 2 and 7 agreed that an employee could no longer perform the role that they were hired for and believe that an employee needs to be multi skilled and able to perform a variety of tasks out of the traditional sense of their job description. Respondent 7 also stated that every role, whether it is low or high skilled, enforced a level of digital literacy in the organization in digital transformation. Respondent 4 agreed with this concept by stating that employees needed to be agile to go beyond their role.

Respondent 7 saw that with digital transformation there would be less a need for middle management and more a need for leaders and innovators since there is less manual input to manage.

Respondent 4 stated that job profiles will be offered more on a contractual basis rather than permanent as systems and processes change and contract workers would work on specific tasks only to implement a specific solution and then move on.

The below graph shows the number of respondents that agree with each type of job profile change.

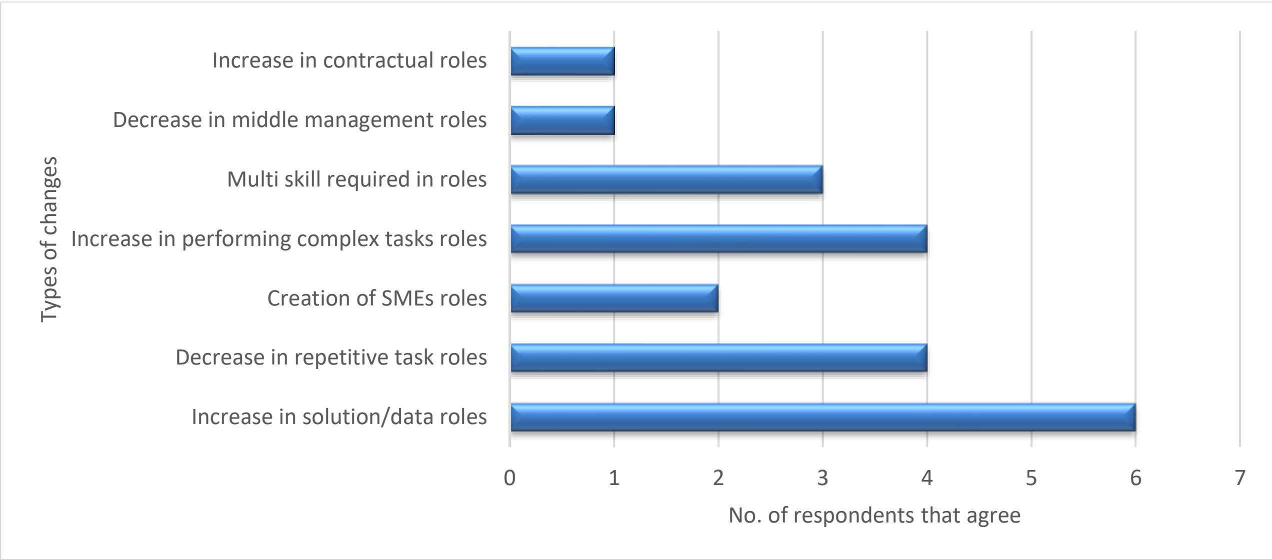

Figure 24: Changes to Job Profiles

4.3.4.2 Theme 5- Opportunities and threats for the workforce

From the literature review conducted it is evident that Industry 4.0 changes can work for and against the workforce depending on how it is managed. Two sub themes emerged: Opportunities and Threats.

Sub Theme 13 - Opportunities

Almost all Respondents agreed that with digital transformation comes new roles and the opportunity for employees to upskill themselves to move into these new roles.

Respondents 2,3 and 6 saw opportunities in knowledge with digital transformation by allowing employees to learn new skills through exploring new roles and through participating in training courses offered by the bank.

Respondents 4, 5 and 6 spoke to the opportunity of a new way of work. Respondent 4 stated that it reduced boredom in employees as there was less manual and mundane tasks to perform and kept employees interested and productive. Respondent 6 agreed with this. Respondent 5 stated that it gave employees freedom to explore and provide solutions and thereby added a solution mindset to their role.

Respondent 2 stated that opportunities were realized through freeing up capacity for workers to learn new skills with part of their jobs being more automated. Respondent 7 agreed with this by stating is allowed for more capacity for employees in decision making processes if their mundane tasks were automated.

Respondent 3 and 7 stated that employees with content specific knowledge are extremely valuable and that there would always be opportunities for them to share their knowledge to influence decisions.

The below graph shows the number of respondents that agreed with each of the specific opportunities for the workforce.

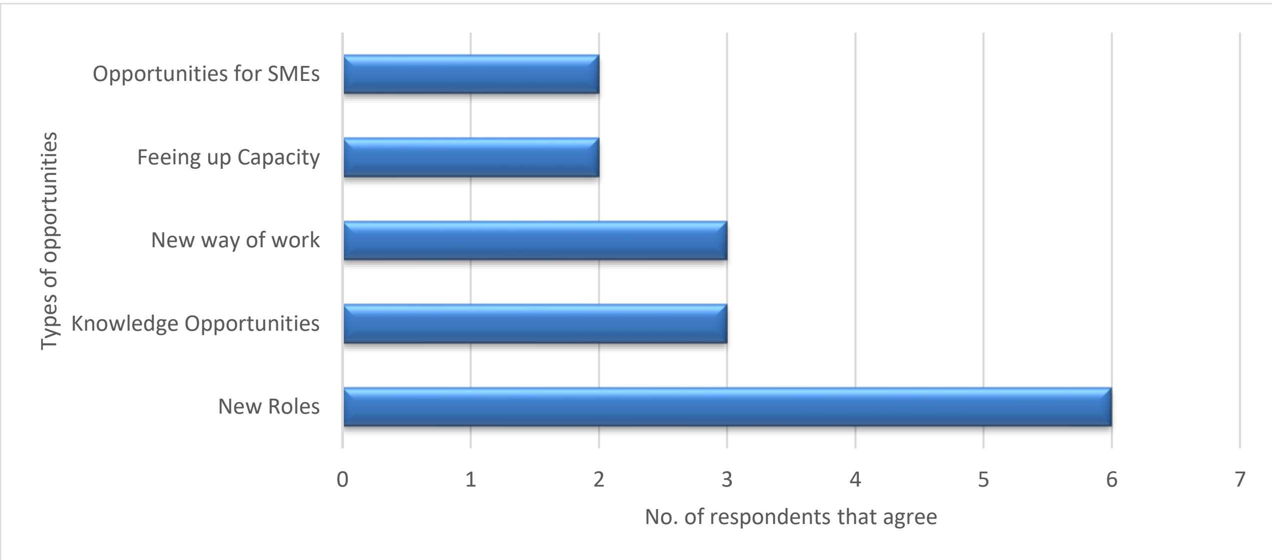

Figure 25: Opportunities for the Workforce

Sub Theme 14 - Threats

This sub theme analysed the threats to the workforce as a result of digital transformation in the business unit. The graph below depicts the number of respondents that agree with each type of threat defined through the analysis of their responses.

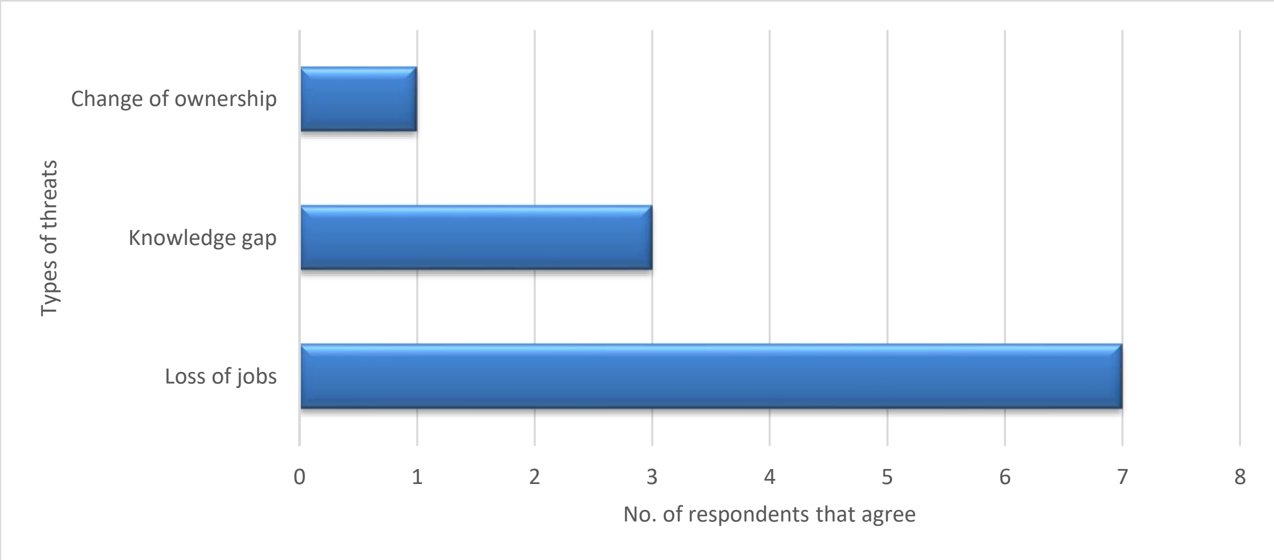

Figure 26: Threats to the Workforce

Almost all Respondents agreed that the major threat to the workforce was loss of jobs. Respondent 6 stated that this would be the loss of admin intensive and manual jobs due to automation. Respondents 1,5,6,7 and 8 agreed that the loss of jobs would be particularly for employees who are unable to adapt and change.

Respondent 2 feared that the treat to the workforce was not exploiting the knowledge gap. According to Respondent 2 this was seen with the mature workforce who were hesitant to change and were often disregarded yet there is a large amount of useful information they could bring to the working environment. Respondent 3 stated that those who do not upskill themselves to bridge that knowledge gap would be left behind. Respondent 7 agreed that for those unable to adapt the constant need for learning was a threat.

Respondent 2 stated that with digital transformation there was a change of ownership in processes with processes being automated. Respondent 2 stated that this created less accountability on the worker and viewed this as a threat to the workforce.

4.3.4.3 Theme 6- Assisting the workforce in transformation

In order for the workforce to adapt in an ever-changing digital world there were two categories that emerged in leadership role and change management and training.

Respondents 1,2,3,4 and 6 stated that the role of leadership in an organization going through digital transformation was critical. Respondent 1 stated that it was the responsibility of leadership to ensure that employees were aware of the changes and what was their role in these changes. Respondent 2 also agreed with this by stating that employees thrive when there is awareness created by leadership to make employees aware of the business strategy and how employees' acceptance of change plays a key role in that. Respondents 3 and 4 agreed that leadership needed to create a support structure for employees with Respondent 6 alluded to this by stating that there should be an adaptive learning culture created.

The role of change management and training should not be underestimated according to most respondents. Respondent 1 spoke to continuous education of the workforce and that the business unit needed to equip the workforce with the knowledge tools that they need to do their job. Respondent 2 also agreed with this. Respondent 5 and 6 recognized the importance of the workforce being trained on their job. Respondent 5 stated that the unit needs to start training employees in the relevant roles for example training workers on what changes mean for their job rather than training them on a specific system as Respondent 5 recognized that systems change continuously in this business unit. Respondent 8 agreed that training needs to be provided to the workforce but believes the responsibility was more on the employee to ensure that they make use of training resources provided by the business unit.

4.4 SUMMARY OF THE ANALYSIS

This chapter analysed the responses from the 8 SMEs by analysing data from the interview transcripts as well as field notes. As such, 6 themes, 14 sub-themes and 66 categories were developed from the thematic analysis.

The implementation of disruptive technologies and degree to which digital transformation concepts are used within this business unit was analysed in this Chapter. This formed the basis to further analyse the impact to the workforce as a result of the changes being made in the current work setting with the outcome resulting in sub themes for the modification of the working environment, modification of job profiles and opportunities and threats presented to the workforce. Respondents also provided suggestions on how to better manage the workforce such that they are able to adapt to an environment that is continuously enforcing changes. The analysis presented in this Chapter will be used to develop the final conceptual framework for the application of Industry 4.0 in the business unit.

CHAPTER 5

DISCUSSION

5.1 INTRODUCTION

The analysis conducted on the data collected from the interviews of eight subject matter experts (SMEs) within a particular Business Banking: Projects and Operations unit will be discussed in this Chapter. In this Chapter the outcomes of the study are discussed in terms of aligning to the objectives of this research as well as comparing findings to existing literature to understand the impact of Industry 4.0 on the workforce within this business unit. This Chapter also outlines the reliability and validity of the research.

5.1.1 Evaluating the implementation of Industry 4.0

In Chapter 2, Section 2.4 an initial conceptual framework was developed to depict the impact of Industry 4.0 on the business unit and ultimately the workforce within the business unit. Based on the analysis conducted the below discusses the current implementation of Industry 4.0 concepts from which a finalized conceptual framework is developed to meet the second and first objectives of this research study.

5.1.1.1 Reasons for aligning to Industry 4.0 principles

From the analysis conducted in Section 4.3.3.1 under sub theme 2, there are four key drivers for making use of disruptive technologies in the current banking environment which are: to be competitive, to be cost effective, to enhance customer experience and to enhance internal capability. Comparing this to the research discussed earlier in this study by Tata Consultancy Services (2018) who state that the drivers for usage are: mass personalization, leverage ecosystems, create exponential value and embrace risk, it can be seen that the unit aligns to two of these drivers in mass personalization and creating exponential value in terms of wanting to be competitive, cost effective and to enhance customer experience. The business unit does not use these solutions to a large extent to leverage ecosystems and embrace risk by collaborating with other organizations as the focus is in first enhancing the internal capability of the business unit. It can also be stated that to some extent the unit uses disruptive technologies and concepts to improve processes and systems so that there is less risk and improved turnaround times which ultimately enhances the customer experience with the bank’s services. In this sense the business unit conforms to the expectation of Slusarczyk (2018) who states that the main aim of Industry 4.0 is to improve operational effectiveness and productivity.

Almost all respondents agree that remaining competitive is the main reason for making use of disruptive solutions. The other reasons for usage in cost effectiveness, enhancing customer experience and enhancing internal capability fit under the banner of wanting to be a competitive bank in a world that is aggressively adopting digitized solutions. Respondents make note of the challenges that the bank faces from newly formed or smaller banks and financial institutions. These institutions are not tied into legacy architecture and can easily implement new solutions without too much of a system and process change. For larger banks, such as the bank under discussion, this becomes an issue as respondents outline that there are many complex functions tied into the current architecture. Respondents state that is immensely critical for the business unit and the bank in general to make use of the latest trends in technology so that they maintain an industry standard and are able to offer competitive solutions.

5.1.1.2 Most relevant technologies

As outlined by the initial conceptual framework in chapter 2, technologies that impact financial institutions to a great degree are automation, big data analytics, artificial intelligence, cloud computing and IoT. It is important to understand the use of these technologies in the current business unit and based on the analysis conducted, that the most relevant technologies to this unit are automation and big data analytics with artificial intelligence being the outcome of automation and data. Cloud computing is seen to be used only to a large extent by the IT space within the department and not by the Projects and Operations space. IoT is not used currently within the business unit. In general, as the analysis in Section 4.3.3.1 under sub theme 1 reveals, the business unit does use disruptive technologies to a high degree as agreed by 62% of respondents.

The business unit’s main aim is to provide the Business Banking segment with credit-based solutions and optimization projects. Respondents note that automation is used in this credit space for quicker credit evaluation through automated decisions as well as pre-approval of products on digital channels offered by the bank. Pre-approval of loans also lends itself to the concept of big data analytics in which useful data is obtained from the customer in order to provide them with automated solutions to their preference.

The usage of AI concepts is seen to be moderate in the business unit and is used within predictive models to offer customers specific products based on their need. The business unit is exploring concepts within machine learning such as reading of financial statements. Respondents noted that disruptive technologies have helped the unit obtain good quality and structured data such that it becomes easier to use in predictive modelling. It is evident from the analysis that as the automation and structure of data improves in this business unit, AI will play a major role in eliminating manual input in banking operations. The direction of the business unit is moving toward automated decisions and improving consistency in a credit space. This is also seen with the busines unit starting to explore concepts of Optical Character Recognition (OCR) which are built on AI principles. Similarly to this, in a study conducted in commercial banks in India by Jewandah (2018), the study finds that banks are aggressively adopting technologies but on the concept of AI banks are still to fully revolutionize processes as the human factor is still critical to business functions.

Respondents within a projects and operations space agree that cloud computing is rarely used. This is because of the regulations restricting the use of cloud computing within a business banking projects and operations space. Capgemini (2011) also alludes to this by noting that banks need to consider issues around data confidentiality, security, regulatory compliance, interoperability of standards, and quality of services. Respondents also note that the drive for cloud computing in a projects and operations space is not as much as it would be for automation and big data analytics as cloud computing solutions focus more on internal efficiencies rather than client facing enhancements. From an IT perspective however, cloud computing is being actively used within this unit as respondents from an IT space state that there have been great strides in overcoming restrictions in the past five years. Due to this, the use of cloud computing is notable in the business unit with the IT space using it for storage as well as automated testing.

All respondents agree that IoT concepts are currently not used within the business unit. The reason for this is that there is no drive for it from a strategic perspective as it does not add value currently in a business banking space. The business unit's priority is more toward entirely automating their simple business functions that would result in accuracy of credit decisions made as well as an increase in turnaround times for loan evaluation. The view is that the business unit has not reached the stage of technological adaptation in which daily operations can employ concepts of IoT. This is due to reasons such as having complex business processes and being tied into legacy architecture. Respondents suggest that a possible way to use it in the future, by the business unit, could be to monitor assets on which they provide loans. This is in keeping with the research conducted by Khanboubi, et al. (2019) stating that banks are starting to use IoT to monitor collaterals and assets in real time. It is opening the possibility for banks to track the status of assets that are financed and allow for financing or transfer of ownership to be entirely a digital process. The suggestion is that such functionality would be able to close the loop in integrating the entire credit value chain in this

Business Banking space. This however would only be a future state in the business unit as current projects focus on improving data quality and access to data such that automated and AI functions can be developed within processes.

There are other technologies likely to influence the current working environment in the near future. According to the analysis this would be blockchain capabilities and Optical Character Recognition (OCR). OCR is a concept of AI and respondents see it being used to read financial statements and systematically populate systems with data thereby eliminating the need for a data capturer. Respondents saw blockchain capabilities being used in the future to assist with digital contracts. Shumsky (2019) also states that blockchain will disrupt financial institutions in the future as it can eliminate the threat or risk in fraud in all areas of banking hence making “smart contracts” less risk prone as blockchain is decentralized. Machkour & Abriane (2020) emphasize that blockchain is at the heart of Industry 4.0 and is extremely critical in digital transformation by having the value of performing tasks much more securely, faster, and cheaper than financial institutions. The business unit is actively seeking to employ such concepts to realize such benefits and it is expected that blockchain will be a major disrupter to its processes and operations within the next few years.

5.1.1.3 Value for the Customer

As stated earlier in this chapter, the business unit focuses on credit solutions. The business unit’s day to day task is to optimize credit systems, operations, and products. In the conceptual framework, which was adapted from Centre of Excellence in Financial Services (2017) from a product perspective, it was established that banks use disruptive technologies to create digital solutions in automated payments and deposits, faster credit evaluation and approval in the lending space, automated advisory functions within investment and automated solutions in structuring share offerings. However, from the analysis conducted in this study, it is seen that the respondents view value added to the customer in terms of a service rather than a specific product. Four out of eight respondents noted that the service provided by the unit to customers is creating customer convenience through digitizing solutions and making it available real time and on one platform for the customer. Six out of eight respondents saw the value in creating client specific solutions which was done by understanding customer data and making use of big data analytics. Lastly four out of eight respondents recognized the value is added in a service that is quick, with automation being used to a great degree so that client facing elements have improved turnaround times.

5.1.1.4 Value within processes

Analysis has also revealed the value that disruptive technologies add to processes and operations within Business Banking: Projects and Operations which stems from the driver to enhance internal capabilities. Disruptive technologies such as automation was seen to add value by removing the non-value adding concepts to processes and operations. Five out of eight respondents stated that it eliminates the manual effort which ultimately resulted in less error due to less assumptions made in processes. In this business unit it allows for credit workflows to be more intuitive and provides input into credit decisioning thereby limiting the work of a credit manager for example. Improved turnaround times for employees and accuracy within their tasks is the product of using disruptive technologies to enhance internal capability.

An important concept that two out of eight respondents agreed on was that having disruptive technologies inherent in processes allows for continuous improvement. Respondents stated that the business unit now has access to data which was previously unstructured and not useful. Access to this data from a system point of view allows the business unit to track which credit workflows are lagging behind or which area of expertise requires training and the business unit is able to act proactively to these issues and resolve them before compounding problems.

5.1.1.5 Digital transformation

Most respondents (62%) stated that the maturity of the strategy towards digital transformation in the current unit was moderate. The strategy is well set out however the unit is not where it needs to be in implementing this strategy to its fullest due to various influential factors. It is important for these factors to be outlined here as they were not explicitly stated in the literature review. The analysis has revealed that understanding these factors is important to recognize the changes needed in an organization if it is to be successful in its digital transformation phase.

An important factor that arose was that the pace of digital transformation was slow due to the business unit being tied into legacy architecture. The unit is highly dependent on this architecture that currently handles complex business functions. Respondents stated that it was extremely important to break away from legacy architecture and design business processes that were less complex in order to compete with smaller banks by speeding up the digital transformation in the business unit. Capgemini (2013) states that to transition from this type of architecture a readiness assessment first needs to be conducted as to which solutions can be automated and focus should be to change that architecture first. Capgemini (2013) further states that initial architecture decisions need to be discussed at length with all stakeholders and bought into to avoid making incorrect decisions for future use. Not knowing the plan for the business unit to transition from this architecture creates a stressful working environment in which an employee has to learn to deal with new technologies but also at the same time work on existing tasks that go against the overall concept of transforming operations within the business unit.

Four out of eight respondents recognized that for digital transformation to be successful, there needed to be a broader base of skills in the working environment. Respondents referred to upskilling current employees as well as employing a fresh mindset in the business unit. This sometimes warrants employment of individuals from other organizations. It is the specific skills, known as “soft” skills such as the example of problem solving needed by the business unit , as also noted by the World Economic Forum (2016) , that is a necessity to the success of an organization in transformation.

Another influential factor to digital transformation is business strategy itself. Respondents stated that projects specifically focused on implementing solutions with disruptive technologies needed to be prioritized if digital transformation was to occur at a more rapid pace. It is also notable that 3 out of 8 respondents agreed with incorporating solutions from fintech companies and other organizations in order to be quicker to the market with certain solutions. It is evident that such factors will have a significant impact on the way of work as the unit continues to strive toward transforming processes and operations.

5.1.1.6 Influential design principles

All respondents agreed that integrated processes and the concept of interoperability was used to a high degree in the business unit and was largely due to the use of automation within processes which was also seen to be used to a high degree as per the analysis. The benefit is having less handover points of data. This in turn translates to less manual input which results in less error. Numerous paper-based processes are being eliminated with integrated processes in the business unit. Respondents noted that efficiency was created in this regard. Spencer (2020) states that interoperable processes provides enhanced information for future decision making. Respondents also agreed with this concept by stating that since the entire credit value chain was fully automated and interoperable, there was more structured data on hand to enhance business functions and track inefficiencies. From an employee perspective reduction in manual input, through having processes and operations that are interoperable, does give the ability for the business unit to repurpose staff to work on higher order functions from the output of data available. In this specific business unit these functions would be in terms of increased involvement in credit decisions and credit-based projects as well as providing more support to clients.

Most respondents (63%) saw applicability of flexibility and adaptability concepts as being in an average or moderate state in the business unit. The current challenges have to do with regulation restrictions as well as the dependence on old business architecture. This aligns with some of the constraints to digital transformation as discussed earlier. Flexibility and adaptability is inherited from the design principle of modularity which is adapting to changing requirements by expanding on individual modules (Hermann, et al., 2015). It is important to note that none of the respondents talk to the impact on the workforce directly however the 63% of respondents that stated there was moderate use view that the business unit was flexible and adaptable from both a system and process perspective in responding to a crisis or sudden change corresponding to literature. The people element in the business unit is not where it needs to be in being open to change the way they work , however in a digital driven world with unexpected changes they are forced to adapt in order to meet the needs of the business unit. Through analysing the responses, it is evident that the business unit needs to be aligned on strategy from all contributing factors in process, system, and people element.

Most respondents (62%) stated that automated decision making was used to a high degree in the business unit. This was followed by 38% of respondents seeing the usage as moderate. Respondents who agree that the usage of decentralized decisions is moderate in the business unit relate the level of automation to complexity of decisions. The unit does automate decisions however the complex decisions are still very much manual. This is seen particularly with the processes and operations in the higher valued market (clients who borrow greater than R75000000) as the nature of business processes and operations in this space is complex with many approvals needed for loans and judgemental decisions required. Respondents who stated that automated decisions is used to a high degree referred to automated tasks and approvals in the lower market (clients who borrow less than R75000000) as there are more functions that lend themselves to being automated due to the non-complex nature of it. The automated decisions are used to score customers for credit based on their risk as well as provide automated approvals of loans. This in turn decreases the amount of effort required from a financial and credit manager in this space. This is critical to free up capacity for employees to perform higher valued tasks and improve turnaround times. It is the eventuality that these decisions become more trusted by the business unit due to the consistency of decisions through less errors. This corresponds to the research conducted by Ustundag & Cevikcan (2017) and Sheshasaayee & Bhargavi (2017) outlined earlier in this study.

5.1.1.7 Finalized Conceptual Framework

Based on the discussions above the finalized conceptual framework is illustrated below to accurately reflect the framework within this business unit based on the responses of the eight SMEs. Drivers for usage of technology is seen as a notable factor to the framework. The influential technologies have been split into the technologies currently used and the technologies that will impact the workplace in the future. The value adding block has been split into the key elements from both a customer and process point of view which leads to the transformation in the workplace and ultimately results in the impact to the workforce.

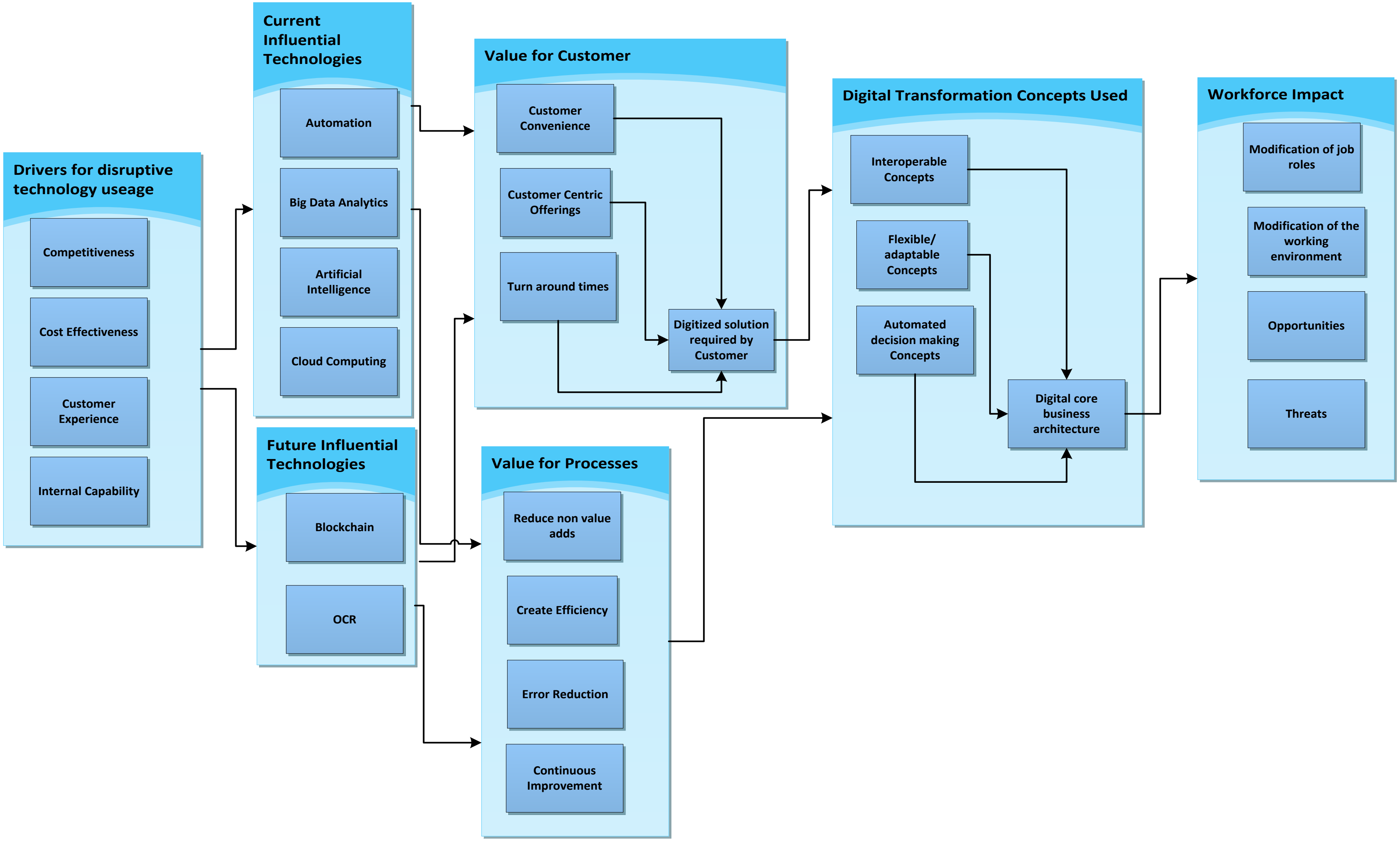

Figure 27: Finalized Conceptual Framework

5.1.2 Impact of changes due to Industry 4.0 on the workforce

In this sub section the impact on the workforce within a particular Business Banking: Projects and Operations unit is discussed due to Industry 4.0. This is in order to meet the third objective of this study and answer the critical research question. In the prior sub section, the application of Industry 4.0 has been discussed which provides the background to understanding what causes the changes to the workforce in this environment.

5.1.2.1 Modification of the working environment

From the analysis conducted, the categories that emerged in terms of changes to the working environment were skill changes, digital solutions, team changes and collaboration.

It was found that the working environment now has a diverse skillset in order to excel in digital transformation. Respondents noted that the employment policies changed within the business unit to employ a younger and higher skilled workforce that were qualified in problem solving or technology related fields. There was also an increased learning culture in the business unit with the responsibility on employees to continuously upskill themselves to be able to adapt to changing working requirements. This is also agreed with by Weber (2016) who states that education and further education play a vital role with further training after initial training being necessary to further develop competencies required in a working environment in Industry 4.0. Respondents agreed that this brought about digital literacy across both the lower skilled and higher skilled workforce with the expectation on the entire workforce to have a greater understanding of data and the application of it. This expectation can sometimes work against the workforce as the requirement to have a diverse skillset that includes both digital competencies (“hard” skills) and non-digital competencies (“soft” skills) creates an environment that is stressed in the response to a change and therefore hesitant of change. To ensure that there is a diverse set of skills respondents believe that the business unit also needs to outsource skills for complex functions and employ individuals from outside the organization to have a new mindset of solving complex problems. Davila (2018) also agrees that due to the skills gap in Industry 4.0 environments, organizations are forced to invest in professionals outside the organization to bridge the gap of the skills that they lack in house. It also provides a cost-effective solution in obtaining the right skills at the right time to stay ahead in the market.

Industry 4.0 drives a digital behaviour in the working environment with the digital solutions available as agreed by 3 out of 8 respondents. The digital tools available such as being able to work remotely, allows for freedom, creativity, and increased productivity in the working environment. The tools allow quick access in collaborating with other employees and completing tasks sooner due to digital assistance such as the creation of digital workers on certain systems. The digital behaviour driven drives the need for vital information to the business unit to be captured on system rather than previous paper-based methods. Through this a working environment culture of being efficient and productive is created.

Bonekamp & Sure (2016) state that there would be an expectation on the working environment to consider teamwork, interdisciplinary cooperation, and partner networks as important. Stemming from the digital tools available, respondents also agreed that this increases collaboration within the business unit with employees within the business unit and outside of the business unit. In an Industry 4.0 working environment shared data sources allow employees from multiple departments to work closer together. This breaks the traditional way of operation in a bank in which data was unshared and each business unit had individual goals rather than aligning to the common goal of the organization.

From a team perspective, respondents recognized that the working environment now consists of specialist teams whose function was to explore digital solutions and creative ways of solving complex business problems. Respondents noted that the sizes of such teams dealing with automation concepts have increased significantly while administrative teams have decreased in size. Such teams have the mandate to break the traditional approach of solutioning and the project development lifecycle to find innovative ways of design and overcoming restrictions in a banking space. This is agreed with by Chowdhury & Murzi (2020) who talk to the concept of teams in Industry 4.0 in an engineering driven or IT environment by stating that teams will consist of highly sophisticated specialists to unpack challenging projects. According to Chowdhury & Murzi (2020) leaders would want to form teams by branching interdisciplinary experts to make decision making more efficient. They also expect that teams will have both human and non-human workers involved in decisioning and task execution all for the drive **of** pursuing efficiency and consistency. This is also alluded to by the analysis in this study by finding that experts are starting to see more digital workers introduced to solve for inefficiencies and create capacity for the higher skilled workforce.

5.1.2.2 Modification to job profiles

Corresponding to the research conducted by Boston Consulting Group (2015) and Manyika & Sneader (2018) it is seen that respondents agreed that new job profiles are created, and existing job profiles are transformed in an environment going through digital transformation. Most respondents in this study agree that there is an increase of solution and data-based roles in the business unit. From a project space there are increasing roles emerging for solution strategists and solution architects who deal with complex projects and business problems. From an operations space there is an increased need for data analysts, data scientists, data engineers and actuaries, who use the data obtained from processes in order to improve operations and evaluate the business better. The IT space is hiring more individuals to write automated testing scripts rather than manual testers. It is important to note that for the business unit to transition from a moderate maturity of digital transformation, to which 63% of respondents agree, to a high maturity of digital transformation, that occupying such roles become vital to the business unit in achieving its transformation goals. The types of job profiles on the rise is also related to the skill of employees to perform higher order or complex tasks. The job profiles that require a higher level of skill are likely to be transformed to include aspects of problem solving and understanding complex business functions as the main importance along with other abilities. Employees are expected to be multi skilled, as also indicated earlier by the skill changes to the working environment and be able to perform tasks outside their traditional job description. The expectation on all roles, whether low or high skilled, is to go beyond the job you were hired for. This is in correspondence with World Economic Forum (2016) who provide the 10 critical skills, mentioned earlier in this study, needed for the workforce in 2020.

The business unit is likely to see changes to job profiles which include tasks that lend themselves to automation. This means that repetitive tasks within roles is decreased which is why respondents stated that they recognized that administrative job roles within the business unit were reducing. There are less positions being advertised for administrative roles such as a data capturer.
Frey & Osborne (2017) also agree that it is these types of job profiles that are likely to become redundant in the future due to computerization. On the other hand, this also corresponds with Manyika & Sneader (2018) that look at the positive aspect in automating repetitive tasks within roles, by stating that especially for the higher skilled workforce it redefines their job role and boosts productivity. Respondents also stated that there was a decrease in middle managers in the business unit as there was less manual input in business process and calls for more leaders and innovators to arise out of managers. This corresponds to Pinsonneault, & Kraemer (1993) that

states that when computing and organizational decisions are centralized, there is a lesser need for middle management through the use of IT concepts.

Sheen (2019) recognizes that subject matter experts (SMEs) were formed out of the third industrial revolution and performed higher order tasks and objectives and they still play a vital role in Industry 4.0 however their role is continuously changing. Sheen (2019) further states that routine tasks in an SMEs role have been digitized which means that they now only take on special cases or value adding activities. Their authority in the workplace has increased as they have access to the relevant data to connect with SMEs inside and outside the organization in order to make the best decision. In this study, it is seen that respondents are of the opinion that the business unit needs to hold on to current SMEs and transform employees with historical and content specific knowledge into SMEs. SMEs have evolved such that they now have more interpersonal skills and decision-making skills that are vital to the success of project management and decision-making processes. These individuals need to be leaders of change and shape the strategic direction of the business unit.

Job profiles in the business unit are likely to be offered on a contractual basis rather than a permanent role. This is because some roles may require the completion of specific solutions from a project perspective. This is in correspondence with Sima, et al. (2020) which states that this brings about flexibility in a working environment as emerging technologies divide the traditional sense of a work task and change employment models to part time, temporary or on demand. Contrary to the benefit in flexibility, according to Phushela (2020) the increase in demand for employees with zero-hours contracts (ZHCs) ,that through data analytics optimize resourcing , although efficient, volatility and social instability can be created with job profiles. The sense of job security in a traditional role seizes to exist. For existing employees the influx of contractual staff to the working environment is most likely to be skills sourced from outside the organization, as stated earlier, which can be seen as a limiting factor for the existing workforce in terms of future job opportunities.

5.1.2.3 Opportunities and Threats

Apart from the creation of new job roles, the need for SMEs, freeing up capacity to perform higher order tasks and new ways of working as discussed earlier in this chapter and outlined in the analysis, another category that emerged in this study was the opportunities created from a knowledge perspective. Respondents saw Industry 4.0 benefiting the workforce in terms of the knowledge the workforce can gain if they are willing to adapt and learn new concepts. The business unit currently has licences to training platforms which they offer to employees to make use of and upskill themselves on various technology related concepts. The business unit also has shared data platforms through which employees can access information on related projects and executive strategies to understand the strategic direction of the business. Li, et al. (2019) finds that Industry 4.0 is a knowledge driven environment that encourages knowledge management, knowledge sharing and knowledge transfer as technological solutions provide easier access to data and information. Respondents also agreed, as stated earlier in this chapter, that Industry 4.0 drives a learning culture and the need for continuous individual improvement to remain relevant as an employee. Employees have a greater understanding of the business as they transition into solution-based roles or SMEs. In a working environment that is changing rapidly, employees go through several versions of their job role performing diverse tasks which allows for the opportunity to expand their knowledge base which in turn provides them with job opportunities in more demanding roles.

On the negative aspect of Industry 4.0, respondents saw the greatest threat to the workforce being the loss of jobs for the administrative staff base and manual intensive job roles as a result of automation. Based on earlier discussions it is seen that the business unit is well advanced in automating routine or repetitive tasks which threatens the lower skilled workforce performing these tasks. In this unit particularly respondents noted that when automated decisioning started to be implemented in 2009 there were 430 credit managers. In the present day there are 209 credit managers employed by the business unit even though the number of clients who borrow money have increased by almost 5 times. This shows how automated decisioning has eliminated repetitive tasks allowing for less resources to be employed with the role of a credit manager significantly becoming less critical in a credit decisioning world. Integrated and interoperable processes have also led to real time interfaces which eliminates the need for many operational staff that capture data between systems. The role of a data capturer in this unit is thus expected to become less a need through interoperable concepts. Based on the analysis with regards to these 2 concepts it can be seen that both the higher skilled workforce in credit managers and lower skilled in operational and administrative staff is indeed under immense threat of becoming irrelevant as both the concepts of automated decision making and interoperable processes and operations are used to a high degree in this business unit. This is in correspondence with Ford (2009) who states that the lower educated and higher educated workforce will be impacted to some degree due to tasks that lend themselves to automation. Frey & Osborne (2017) agree with this by stating that it is more apparent for the lower skilled jobs to be susceptible to computerization by finding a negative correlation to an occupation's computerization probability and its wages and educational objective.

SMEs are also weary of the threat in creating a knowledge gap within the business unit as a result of implementation of Industry 4.0 concepts. It is seen that some employees are hesitant to change and based on analysis conducted many employees are also unwilling to adapt and change and make use of the training platforms provided by the business unit. Employees that do not seek to upskill themselves will create a disjoint in the business unit in terms of the strategy of digital transformation and the actual implementation of it due to the human factor that is not willing to adapt. Overall, it is noted that a broader skillset is required to speed up digital transformation and be productive in an environment going through digital transformation as indicated earlier in this chapter. The recommendation from respondents is that the business unit invests in training and change management across all levels of employment and trains employees in the specific roles rather than on systems. The responsibility is also then on the employee to make use of these training platforms provided in order to remain effective in this current environment. Respondents noted that with increased automation employees become less accountable for decisions and actions and it can be said that this brings about the lack of motivation and somewhat creates laziness among the workforce to upskill and remain relevant as they have built the trust with digital solutions in the current working environment. Maisiri, et al. (2019) states that the lack of skills which contributes to the knowledge gap will adversely impact organizations in terms of performance and competitiveness. Maisiri, et al. (2019) further states that in developing countries such as South Africa the threat is indeed a reality as the mismatch between available skills and skills required by the industry in one of the contributors to high unemployment rates in the country. This shows that the business unit faces a difficult situation in which they need to aggressively implement Industry 4.0 concepts but at the same time automation is reducing jobs in an environment that requires the creation of jobs. New job profiles roles in an Industry 4.0 environment is difficult to occupy due to the shortage of skills thus the potential for the knowledge gap in the current working environment can be seen to be significantly high.

5.2 CONCLUSION

The results presented in Chapter 4 were analysed and interpreted in this Chapter. Discussion of the results has shown how the results agree with existing literature as well as provide additional concepts that are notable in the current setting.

The next chapter contains a summary of the research study, conclusions, and recommendations.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

The previous chapter discussed the information obtained from the interview questions. This chapter provides a summary on the conclusions and reflects on the entire research study. It also includes limitations of this study and recommendations for future research in the organisation or this field of study.

6.1 CONCLUSION

The overall objective of the research study was to determine the impact of Industry 4.0 on the workforce within a Business Banking: Projects and Operations environment within a particular Bank. This was accomplished by developing 3 objectives which guided the literature review, research design and methodology.

An initial conceptual framework was developed and evaluated through semi-structured interviews conducted with eight subject matter experts within a particular Business Unit in a Business Banking: Projects and Operations Environment. A qualitative approach was used with the data analysed in Microsoft Excel to determine codes, categories, sub-themes, and themes.

The findings suggest that the Business Unit is aggressively seeking to implement disruptive technologies and digitally transform current processes and operations in order to remain competitive, improve internal capability, improve client experience and to reduce operational costs. Due to the changes brought about through digital transformation, in conforming to Industry 4.0 standards, the findings resulted in the development of 3 themes particularly related to the impact of the workforce in this setting. The research suggests that there would be changes to the working environment such that it requires existing employees to broaden their skill set to be able to adapt in this environment. There would also be increased collaboration and changes to the types of teams required to successfully implement digital solutions. The digital behaviour being driven in the current working environment was found to create both opportunities and threats for the workforce. Opportunities were found in new roles and the knowledge gained from working with new technology but also for employees that have content specific knowledge in which their roles can be transformed to subject matter experts or key decision makers. The use of technology in the Business Unit was found to free up capacity for both the lower and higher skilled workforce to perform more valuable tasks. The threat, however, is for the employees unwilling to adapt, with the concern around the loss of jobs and broadening the skills gap thus being a constraining factor to digital transformation. The findings outlined that it is not only the responsibility of the Business

Unit to provide training platforms for employees but it is key for employees to take on the responsibility of making use of the training platforms and materials provided to them so that they can be transitioned into the new job roles offered rather than becoming redundant.

The final conceptual framework was presented in Chapter 5 and outlined amendments to the initial conceptual framework from both a technology and digital transformation implementation perspective. This was also compared to existing literature. This outlined the correspondence and deviation to existing research conducted to provide the final and practical illustration of the implementation of Industry 4.0 in the current setting through the discussion of the in-depth responses from experts.

6.2 RECOMMENDATIONS

6.2.1 Recommendations for Future Research

In this research study, the sample population was limited to participants from a specific unit in the Business Banking: Projects and Operations environment in a particular bank. It would be beneficial to extend the study to other experts in other units in a Business Banking: Projects and Operations environment within the particular bank. This will provide researchers to gain a greater understanding of the overall impact of Industry 4.0 on the workforce within this environment. Additionally, a comparison between departments can also then be done and a consolidated view can be discussed.

A greater sample size to include more SMEs would be beneficial in terms of getting more input into the research. SMEs could also be categorized in terms of their years of experience, age and qualifications to understand how these categories could statistically influence the outcome based on experiences within different stages of digital transformation in the organization.

To further increase reliability and validity of the study a recommendation for future research would be to increase the selected sample to not only include SMEs but also other members of the workforce. Members can then be segmented into lower skilled and higher skilled workforce based on qualifications and the impact to both these groups can directly be observed and greater detail can be provided.

Another way for future researchers to improve reliability and validity would be to use a third method of data collection (other than interview transcripts and field notes) such as surveys administered to the general workforce which will also provide more detail on related impacts to segments of the workforce in this setting as well as provide context to changes for specific job roles.

6.2.2 Recommendations for the Business Unit

The workforce is a vital aspect to any organization and this study has outlined the importance of having an operating framework that is adaptable and flexible in the system, process and people elements in a Business unit. It was found that the business unit applies many disruptive technologies and is aggressively transforming processes and operations in order to align to its digital transformation strategy. Changes for the workforce thus become inevitable and this study has outlined that the lower skilled workforce is threatened and to some extent certain high skills jobs are also at risk of becoming non-existent in the future in this Business Banking: Projects and Operations environment.

Assistance needs to be provided to the part of the workforce that is threatened by changes. This will consequentially positively influence the pace of digital transformation in the business unit that is hindered due the human factor. The recommendation for the business unit is for leaders to clearly outline the digital strategy of the business unit and the organization. There needs to be more responsibility placed on leadership in the business unit to create awareness for employees so that employees understand where they fit in to this strategy and what needs to be done from their side in order to remain relevant or use the tools provided to upskill themselves. Leadership needs to create a support structure for individuals in job profiles that are under threat by creating an adaptive learning culture and trying to transition individuals in administrative based roles into a solutions role or involve elements of solutioning in current administrative roles such that it makes it easier for employees to transition into other roles when their tasks become automated.

The study has also outlined the significance of change management and training. Within Business Banking: Projects and Operations in this particular bank some respondents noted that training departments were being downsized. In an environment that is transforming at a rapid pace, more investment needs to be provided in change management and training departments such that they are able to reach a broader base of the workforce and in particular the lower skilled workforce. The recommendation is that when digital solutions are implemented there should be a central source to store change management documentation related to projects or changes implemented such that it is accessible by all employees. Awareness needs to be created by the specialist training team on the training platforms offered to employees so that there is greater use of these platforms by employees as they are able to understand the strategy and the reasoning behind it thus promoting the culture of self-learning. The research outlines that the business unit is moving towards decommissioning systems and legacy architecture. The recommendation is for employees not to be trained on systems entirely but also in the relevant roles that they were employed for as well as emphasizing critical thinking and problem solving in training provided. There should also be increased training provided for employees to develop their “soft” skills in an environment going through digital transformation such that the workforce has a hybrid set of “hard” and “soft” skills as outlined earlier in this study. The research has also identified that SMEs are important to ensure continuous improvement on business processes with the implementation of technological concepts. The mature workforce is also seen to be threatened by new digital solutions. The recommendation for the business unit is to transition the mature workforce, having specific knowledge on processes and operations, into SMEs within the department such that they are involved in influencing decisions from a historical business knowledge point of view.

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APPENDIX A: LETTER OF INFORMATION

Dear Interviewee,

Re: Participation in Research on "The impact of industry 4.0 on the workforce within a particular Business Banking: Projects and Operations Unit"

Thank you for agreeing to participate in an interview to assist with the research done on the impact of Industry 4.0 on the workforce within a particular Business Banking: Projects and Operations environment in our bank*.

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 Mrs. Bernadette Sunjka. My MSc title is: The impact of industry 4.0 on the workforce within a particular Business Banking: Projects and Operations Unit"

My belief is that the with the dawn of the digitization era, also referred to as Industry 4.0, this revolution will lead to an increase in productivity and immense change in industrial growth and will play a significant role in changing and adapting the profile of the workforce to ensure competitiveness in a new digital world. The Banking workforce needs to ensure that they are able to adapt to working within an environment that is required to produce innovative solutions to customer's needs in an ever-changing digital world. I would specifically like to understand how Industry 4.0 technologies and concepts are being implemented in this Business Banking: Projects and Operations space and also the impact of these changes on the workforce.

I would like to formally invite you to participate in this study. As an expert in our company*, a big and well-established bank in South Africa, your knowledge and experience would contribute significantly.

The study will be conducted between October and November 2020. Involvement in the study would entail a virtual interview, at your convenience. During these interviews I would like to understand based on your views and experience, how digital transformation impacts the workforce. I will also discuss a framework with you regarding the general digital journey and understand more about the issues faced in this.

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

Jared Subramanien

Tel: 072 203 8879 Email: jleesubra@gmail.com

Supervisor: Tel: 011 717 7007 Email: Bernadette.Sunjka@wits.ac.za

*Company name omitted for privacy purposes

APPENDIX B: 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 C: INTERVIEW QUESTIONS

Interview questions for Research Project for degree of Masters of Science in Engineering (50/50)

Title: THE IMPACT OF INDUSTRY 4.0 ON THE WORKFORCE WITHIN A BUSINESS BANKING: PROJECTS AND OPERATIONS ENVIRONMENT

Student Name: JARED SUBRAMANIEN

(Student number: 576849)

School of Mechanical, Industrial and Aeronautical Engineering, University of the Witwatersrand

Demographics and Additional Information

Participant No:	
Job Role	
Experience in current role	
Experience in Business segment	
Job Area	
Experience with technology related projects	

Background to Interview

1. Introduction to Industry 4.0
2. Purpose of research

Interview Questions

Disruptive Technologies	
IQ1	Tell me how you would describe the current use of disruptive technologies in Business Banking?
IQ2	How would you describe the importance of embracing disruptive technologies in Business Banking?
IQ3	What technologies do you see as the key disruptive technologies in Business Banking and how are they currently used?
IQ4	Describe how other current technologies and technological concepts have an influence in changing the way this business operates?

Front line and Back office impact	
IQ5	Describe how we add value for the customer by using these disruptive technologies in terms of the solutions/products/ services produced?
IQ6	Describe how we add value to our processes by using these disruptive technologies?

Digital transformation	
IQ7	Tell me about the digital transformation strategy within Business Banking in its current and future state in terms of digitizing processes and operations?
IQ8	What further do you believe needs to be done for us to speed up this transformation process?
IQ9	Describe the current use of integrated processes in Business Banking the benefit of it?
IQ10	Describe the current use of flexible/adaptable processes in Business Banking and the benefit of it?
IQ11	Describe the current use of automated decision making processes in Business Banking and the benefit of it ?
IQ12	Tell me about other transformational concepts you see being used?

Workforce Impact	
IQ13	Tell me how you would describe the changes to the current working environment as a result of digital transformation?
IQ14	Tell me how you would describe the changes to job profiles as a result of digital transformation?
IQ15	Tell me what you see as the opportunities for the workforce as a result of digital transformation
IQ16	Tell me what you see as the threats to the workforce as a result of digital transformation?
IQ17	How have you seen the workforce adapt/take to digital transformation concepts?
IQ18	In your opinion describe what further needs to be done to ensure that the workforce is able to perform in an ever changing digital world?

APPENDIX D: INTERVIEW TRANSCRIPTS AND FIELD NOTES

Participant 1

Interview questions for Research Project for degree of Masters of Science in Engineering (50/50)

Title: THE IMPACT OF INDUSTRY 4.0 ON THE WORKFORCE WITHIN A BUSINESS BANKING: PROJECTS AND OPERATIONS ENVIRONMENT

Student Name: JARED SUBRAMANIEN

(Student number: 576849)

School of Mechanical, Industrial and Aeronautical Engineering, University of the Witwatersrand

Demographics and Additional Information

Participant No:	1
Job Role	Solutions Architect
Experience in current role	6
Experience in Business segment	7
Job Area	Projects
Experience with technology related projects	18

Background to Interview

1. Introduction to Industry 4.0
2. Purpose of research

Interview Questions

Disruptive Technologies	
IQ1	Tell me how you would describe the current use of disruptive technologies in Business Banking
Ans1	Within Business Banking we are starting to use disruptive technology. My understanding of why I say that is because for a very long time we have been focused on user experience however as we move forward we are more customer faced and now looking at the client to do a bit more of that work for us in terms of making it a bit easier for the customer not having to come into the bank to transact or apply for products. Over and above that how we

	are using disruptive technologies, key thing is around data, actively sourcing data and gathering information and doing analytics on that data to then apply it to the customer's profile, to then adapt it to the customer's needs. So using the data that we gather to possibly offer the client new products, or remove products from the customer's profile that's no longer required. In smart solutions it also helps a lot for example with things like drawing up a digital agreement with the customer so the client doesn't have to physically sign documents. They got the smart technologies were customers can actually do that online and avail of those products real time instead of waiting. So the key thing is using disruptive technologies to make things available to the customer real time, on demand meeting those needs.
IQ2	How would you describe the importance of embracing disruptive technologies in Business Banking
Ans2	First and foremost for me all of our competitors are embracing these technologies so if we don't embrace it as business banking we are going to be left behind. In order to stay above the curve we need to ensure that we embrace the latest technologies and at the moment these are your disruptive technologies using smart phones and smart technologies to basically assist the customer and more than assist the customer also from a user point of view as well making it easily accessible , making it user friendly, the speed at which we implement things or the processes that we follow with these technologies in our day to day roles as well. There's multiple layers of importance , we need to keep up with our industry standards and competitors and also internally we need to make sure that we enhance our processes and make it simple for the client as well as for us as employees of the bank.
IQ3	What do you see as the key disruptive technologies in Business Banking and how are they currently used?
Ans3	I can identify 2 which we are currently using and enhancing on a monthly basis. The first being big data , we using this data and data analytics to gather information on customers, on services, on trends in the market to then better streamline our processes, our products etc. from an automation point of view as well, the two also speak to each other, in terms of assisting. So in order for us to do automation we need to have the data to drive automation. One of the examples of automation that I could maybe cite is renewing of overdraft facilities, pre-approving clients for credit,

IQ4	Describe how other current technologies and technological concepts have an influence in changing the way this business operates?
Ans4	So I do in the mid to long term things like biometrics could change the way we do business. Some of it we have embraced on smartphone instead of the client inputting their password all the time we do have biometric sensing that can pick up facial recognition, thumbprints, even the wireless tapping functionality

Front line and Back office impact	
IQ5	Describe how we add value for the customer by using these disruptive technologies in terms of the solutions/products/ services produced?
Ans5	From a client point of view gone are the days where a customer needs to come into the branch to request certain products. What we are driving is seeing the client's trends and transaction history and from this data we can derive what is it the client seeks by way of credit or services or products that we as a bank offer and then proactively offer these clients to the product by using these disruptive technologies and making those products available real time. In our area there's two that use this to a great degree. One is pre approving clients for credit. Inversely to also monitor the clients behaviour. If the customer is not performing at the levels that they are used to we can then proactively drop the customers products.
IQ6	Describe how we add value to our processes by using these disruptive technologies
Ans6	For me focus areas will be contracting the clients in terms of having the ability to digitally sign without having them to scan and send those documents in. Also third party interfaces like your credit bureaus to make sure that we have those interfaces real time so that we don't have to wait for someone to vet like a credit manager for example

Digital transformation	
IQ7	Tell me about the digital transformation strategy within Business Banking in its current and future state in terms of digitizing processes and operations?
Ans7	At the moment we are very much, I don't want to say customer facing , but we got systems which users are currently using and the customer still has to come into the bank a lot of the time and our systems are geared to give the

	best solutions for that type of strategy. Moving forward we trying to move away from those internal systems and make it more customer facing, where the customer is more in control of what they do (to opt in or opt out of certain services. And use the tools available to them to opt in I would say we are between infancy and the middle with digital transformation
IQ8	What further do you believe needs to be done for us to speed up this transformation process?
Ans8	The stumbling blocks that we have is that we are very reliant on old technology and reluctant to move onto new technology but that seems to be falling away. We've got a lot of staff, myself included , that have been involved with the bank for quite some time and to let go of that legacy systems is a big thing and we need to embrace the new tech. However before embracing it we need to understand what the old tech is offering and whatever the new tech is offering we need to ensure that it caters for what the old is offering
IQ9	Describe the current use of integrated processes in Business Banking the benefit of it ?
Ans9	So at the moment , I would say, you asked me a question before as to where we are. So from an integration point of view we are almost in the middle because we do have quite a bit of integrated processes and systems that speak to each other and we have had that for quite some time. Our ability to speak across platforms is quite good, it can be improved For me the benefit would be is that it is efficient, it saves time and money. You have these integrated processes , you don't have multiple processes and each process speaking to a single system. You might have one or two processes that are integrated to multiple systems that do the job that required multiple processes and multiple systems to be done in the past
IQ10	Describe the current use of flexible/adaptable processes in Business Banking and the benefit of it ?
ANS10	What we have tried to do for the long term, speaking specifically to CAS and online banking, the processes that we have built, we have tried to build them across , so irrespective of platform to almost be agnostic. When we build business functions its basically plug and play so that other systems and platforms that come on later can just use the functionality that we have created without having to really redefine or redo work that has already been done. So whatever we do we try to reuse as much as possible.

IQ11	Describe the current use of automated decision making processes in Business Banking and the benefit of it ?
Ans11	We are midway, not yet at advanced stage . theres a few examples that I could cite here. We are one of the very few banks in South Africa that scores customers at a product level which gives real time decisioning which is automated. We do have user input in the event the customer doesn't qualify or its referred or declined. We also have automated decisioning in terms of preapproving clients for credit and also renewing of facilities which is also done automatically. Theres quite a few systems that we have automated thus far, we are building and enhancing that on a monthly basis
IQ12	Tell me about other transformational concepts you see being used?
Ans12	We are looking at using data and robotics on a daily basis to see how we can improve their lives and service products over their life time. By doing that they would no longer need to apply for products in the future, the bank will proactively grant them based on the need identified

Workforce Impact	
IQ13	Tell me how you would describe the changes to the current working environment as a result of digital transformation?
Ans13	Im going to cite the current situation we are in which is covid, that has really brought to the fore how we have embraced new technologies. The ability to work from home has just made it that much easier , so we are using tools like we are currently doing like Teams and other smart technology to do our jobs irrespective of what those roles may be. There's a minimal need for a wide variety of people to go into the office to get the job done. from a collaboration point of view definitely a need that people work more closely together but that does not mean closely physically. Closely together in terms of across systems and business units to make sure whatever they are doing does work
IQ14	Tell me how would you describe the changes to job profiles as a result of digital transformation?
Ans14	I started as a data capturer and moved on to a business analyst. I did not know there was such a thing as a solutions architect or a solutions strategist. So all of these titles are new and they were basically born out of this digital revolution that we are going through. I see more of these technologies being created as we embrace these smart technologies. Repetitive work will no longer be required because we will have things like robotics and system processes that will cater for that. You're going to need people that have that future thinking ability to go and enhance processes and systems to cater for whatever the client's needs might be in the future

IQ15	Tell me what do you see as the opportunities for the workforce as a result of digital transformation
Ans15	There’s going to be a lot of processes that have to be enhanced and opportunity for process engineers, solutions strategists and those type of individuals to come to the fore to show how they could implement solutions that then work with the smart technologies that we have today
IQ16	Tell me what do you see as the threats to the workforce as a result of digital transformation?
Ans16	Some of the threats would be for employees who are not willing to embrace new technology might be left I a position in which they lose their job. Careers or jobs in which the redundant or repetitive tasks are being done, those jobs might also be lost. So there is that threat were peoples jobs might be lost in which they might be replaced by AI and robotics and those type of things The opportunity outweighs the treat. I also believe that with these new roles being created , financially they are going to be viable. Today if you are doing these repetitive tasks in terms of your growth its limited whereas with these new roles that are being created basically the sky is the limit
IQ17	How have you seen the workforce adapt/take to digital transformation concepts?
Ans17	We are actively hiring younger and smarter people, people that are qualified look to the senior guys for guidance. But coming out of varsity these concepts and ideas are fresh in their minds. They are very familiar with these smart technologies and add a lot of benefit to the business. So its basically bringing that out of the box thinking that we require moving forward.
IQ18	In your opinion describe what further needs to be done to ensure that the workforce is able to perform in an ever changing digital world?
Ans18	So one of the key things that we need to ensure when we build these systems and processes is that we need to ensure that our data is correct, relevant and up to date. All of those data principles need to be adhered to because for me the a lot of the hype is around data and that is key. If we got the right data the sky is the limit and there’s a lot we can do with what we have.

	I think we need to educate the workforce in terms of what these new technologies offer and thereafter send them on the relevant training to be able to give them the tools to equip them to do their job. But critical is that leadership needs to make the staff aware of what these technologies are and where the business is going so that they can have buy in.

Field Notes for Participant 1

Disruptive Technologies	
IQ1	Tell me how you would describe the current use of disruptive technologies in Business Banking ?
Ans1	• Initial stages with disruptive technologies • We use customer data and apply analytics to tailor offerings to the customer • Digital solutions create efficiencies for the customer
IQ2	How would you describe the importance of embracing disruptive technologies in Business Banking?
Ans2	• To remain competitive • Needed for customer orientation • To keep an industry standard
IQ3	What do you see as the key disruptive technologies in Business Banking and how are they currently used?
Ans3	• Big Data Analytics and automation are key
IQ4	Describe how other current technologies and technological concepts have an influence in changing the way this business operates?
Ans4	• Biometric technologies to influence future operations

Front line and Back office impact	
IQ5	Describe how we add value for the customer by using these disruptive technologies in terms of the solutions/products/ services produced?
Ans5	• Creating a better client experience through digital solutions (saves client time and money)

	• Use data from tracking the customer's behaviour to influence products offered or decisioning from a back end perspective such as credit decisions.
IQ6	Describe how we add value to our processes by using these disruptive technologies
Ans6	• Real time interfaces allowing for less manual work.

Digital transformation	
IQ7	Tell me about the digital transformation strategy within Business Banking in its current and future state in terms of digitizing processes and operations?
Ans7	• Between initial and middle stages of transformation • Rely on internal systems to do the work but not at the point where we are fully automated in collecting data and analysing it and producing something useful
IQ8	What further do you believe needs to be done for us to speed up this transformation process?
Ans8	• Decrease the dependence on legacy systems
IQ9	Describe the current use of integrated processes in Business Banking the benefit of it ?
Ans9	• Processes and systems are integrated, and it allows for efficiency and saving of time and money. • Integrated processes allow for less handover points of data to accomplish the same task- in essence this is less risk through manual input and disjointed processes.
IQ10	Describe the current use of flexible/adaptable processes in Business Banking and the benefit of it ?
ANS10	• We try to reuse as much as possible so that systems are agnostic across the board.

IQ11	Describe the current use of automated decision making processes in Business Banking and the benefit of it ?
Ans11	• We have automated decisions from a credit point of view that score customers for credit. Through this we can pre-approve clients for a loan involving limit manual input. Higher decisions are only referred to a user such as a credit manager.
IQ12	Tell me about other transformational concepts you see being used?
Ans12	• Data and robotics will allow for offering of products to clients

Workforce Impact	
IQ13	Tell me how would you describe the changes to the current working environment as a result of digital transformation?
Ans13	• Change in working methods through digital solutions • Increases collaboration between teams
IQ14	Tell me how would you describe the changes to job profiles as a result of digital transformation?
Ans14	• Moving toward solution based roles • Decrease in repetitive roles • Increase in people with know how on technology and strategy
IQ15	Tell me what do you see as the opportunities for the workforce as a result of digital transformation
Ans15	• Opportunities for workers involved in solution based and process thinking and change
IQ16	Tell me what do you see as the threats to the workforce as a result of digital transformation?
Ans16	• Threats to employees unwilling to learn • Threats to employees performing redundant tasks

IQ17	How have you seen the workforce adapt/take to digital transformation concepts?
Ans17	• Hiring a more qualified workforce to tackle digital transformation
IQ18	In your opinion describe what further needs to be done to ensure that the workforce is able to perform in an ever changing digital world?
Ans18	• Educate the workforce about these technologies and business strategy

Participant 2

Interview questions for Research Project for degree of Masters of Science in Engineering (50/50)

Title: THE IMPACT OF INDUSTRY 4.0 ON THE WORKFORCE WITHIN A BUSINESS BANKING: PROJECTS AND OPERATIONS ENVIRONMENT

Student Name: JARED SUBRAMANIEN

(Student number: 576849)

School of Mechanical, Industrial and Aeronautical Engineering, University of the Witwatersrand

Demographics and Additional Information

Participant No:	2
Job Role	Solutions Strategist
Experience in current role	4
Experience in Business segment	7
Job Area	Projects
Experience with technology related projects	7

Background to Interview

1. Introduction to Industry 4.0
2. Purpose of research

Interview Questions

Disruptive Technologies	
IQ1	Tell me how would you describe the current use of disruptive technologies in Business Banking
Ans1	First one that comes to mind is our digital offerings, so we have the ability for the customer to apply for credit using the internet or an app. It gives the convenience of applying for credit whenever the client wants to. Also with that offering we use Decisioning as a Service where that application and the customer is scored real time. So you have the ability to have an approved application within 3 seconds. That's one of the things we are quite advanced

	in from a disruptive technology perspective is our digital offering as a bank. We are very big on data in the bank, its an area or capability that is currently allowing us to implement a lot of projects. I think from the level of detail that we are getting through our metadata warehouse, all of that is currently used for predictive analysis or predictive offerings where we actually can pre score you and that offering is more push notification instead of the customer coming to us and asking for something. We can actually pre-empt that the customer is going to need a certain credit product and we create that through convenience. I think one of the other focus areas is consolidating systems and in consolidating systems the aim is to get an overall product offering as compared to silo'd product houses all offering the client different solutions and products. In consolidating some of our platforms we then have the ability to look at the customer overall and structure our product offerings based on the customer need as opposed to where we are falling short in the market for example. This also leans on the data that we have and then through that integrated approach in consolidating some of our systems
IQ2	How would you describe the importance of embracing disruptive technologies in Business Banking
Ans2	To be relevant in the market. If we are not in a position of offering these disruptive technologies we fall short in terms of our client base as well as the ability to take on new clients. In the coming few years its probably going to be a tough economic climate so it does become important to make sure we can at least retain our customer base and then growing the customer base becomes a luxury. If we are not in the position in which we can offer these capabilities we are definitely falling short in the market. I think from an internal perspective, from our staff, the workforce is becoming younger and your new talent is looking for new challenges. We are seeing that the younger staff is not really interested in legacy capabilities, they do want to work on the new technologies, they want to work on strategies. In a market that is short on skills, if we are not changing our technology as a bank that also has a big impact on our skills retention. And I also just think , getting to the market quicker, we wont be able to reach our customer base quick enough. It also speaks to the ability to making sure we stand out as a bank
IQ3	What do you see as the key disruptive technologies in Business Banking and how are they currently used?
Ans3	From an automation perspective we are in a position where our credit value chain is fully automated from a scoring perspective. In terms of staff intervening there is minimal intervention. The customer can apply for credit at his own convenience, runs through the scorecard, the scorecard retrieves a decision and the pay-out is done systematically. In that instance we are fully

	automated on some of our products. We are looking to expand automation on some of the other products. from a big data point of view we are currently looking at Credit Risk Enterprise Management (CREMs) , through the use of data we want to do proactive recoveries and collection management. So that is something we can do early on with the customer to try and create recovery strategies as opposed to write our debts off and make the customer experience a bit better by putting in proactive measures. I think from a systems perspective, because we have so many systems in our area, that data we can track and that data we use to optimize our offering, we use it for trend analysis. Basically what comes off that from a scoring perspective we know we shouldn't be extending too much credit in the tourist industry for example. We can adjust our scorecards so that we can rely to some extent on credit managers for oversight. we managed to reduce our activity time on one of our systems by 24% because of the data analytics that we have done. We have looked at some of the pain points from the users and put in solutions to address some of those items. The data also reflected where we are falling short on training and we were able to manage some of the user experience and frustration through enhanced training mechanisms.
IQ4	Describe how other current technologies and technological concepts have an influence in changing the way this business operates?
Ans4	I think making use of OCR is going to change the way that we do business. So we currently have a team that manually captures financial statements into a system and then we do the spreading thereafter. Through use of OCR we are looking at automating that where statements will be scanned and using OCR technology capture the information for the spreading. making use of OCR technology to get everything that was done manually on paper and getting that data on the system is a big drive for us instead of getting people to manually capture that information on the system. Robotics is being explored, we had a pilot robot that stores credit applications on our system.

Front line and Back office impact	
IQ5	Describe how we add value for the customer by using these disruptive technologies in terms of the solutions/products/ services produced?
Ans5	Disruptive technology gives you the ability to offer client centric offering as opposed to pushing products to the customer that they actually don't need.

	You are able to look at the customer holistically , give them an offer that is relevant to their current need and pre-empt what they could need. For example on our app we have the ability to manage funds and set up notifications in which the client is going to have a distress and you can offer an overdraft to carry the client through the remainder of the month. making sure that we are able to offer it quick, making sure our turnaround times are as quick as possible, shortening our turn around times. Also dealing with the new client in which they are a lot more demanding, a lot more impatient, they want things to be solved asap. Its an important component to having the systems in place in order to minimize the turnaround times. The new market is about convenience, nobody wants to go into the shop to do things, you just want to purchase something online and have it delivered at your doorstep. That is a big focus for us as a bank on our client and making sure that the staff is able to support that strategy
IQ6	Describe how we add value to our processes by using these disruptive technologies
Ans6	By decreasing manual intervention we are reducing the time taken to do tasks. The process becomes an enhanced process either through introducing intuitive workflows, building intelligence into systems where you can retrieve certain data fields as opposed to capturing the same field 10 times over. Using the data we get from the system to continuously enhance our processes, that’s a big benefit we have in our space in which we can actually track some user experiences and enhance what those processes are. I think automation, using robotics to do some of the things we would normally rely on manual intervention for and then OCR for manual capture

Digital transformation	
IQ7	Tell me about the digital transformation strategy within Business Banking in its current and future state in terms of digitizing processes and operations?
Ans7	We are fairly advanced within our area, there is minimal space for manual work. From a digital optimization perspective we definitely have a key strategy there where we consolidate systems. From a digital perspective we have a full digital offering for our clients. Our focus is now to make sure that our product offerings not on our digital strategies that we add them to our digital channels and then make sure that from a client perspective and right through to fulfilment that their journey is a digital journey. So as far as the customer facing elements that are digital there is some work that needs

	to be done to fully automate that process. I think from a digital strategy we want the customer to have one experience with the bank and that means one platform, one entry point to interact with us as a bank whether its assisted or unassisted platforms we just want to offer a single journey. And then on the other hand for staff to also interact in that matter. That is our digital strategy in terms of making sure from the time the client interacts with us its fully automated and on our digital channels
IQ8	What further do you believe needs to be done for us to speed up this transformation process?
Ans8	I think as a bank we need to understand that there is a digital strategy in place and what that means is letting go of some of the immediate needs or deprioritizing some projects where that capacity could be refocused to making sure our transformation is according to plan. From that perspective there is a big change in mindset to know I need to sacrifice some of the projects that I believe I need now knowing that I can benefit from the projects that's more aligned to our strategy. A skills topic comes into play- with digital transformation there's new skills that's needed from the bank , this is from a technical perspective and product offering. I do think that if we have a different set of skills we could speed up the transformation process. I think making more use of our data, we know that historical data is a bit difficult to find and that does present a gap, but from the data that we do have we need to make sure we keep building on that in terms of on this digital journey we can use metrics to achieve what we need to achieve as opposed to achieving what we set out to achieve. Because that journey might change. Its just making sure we solve for the right items, we prioritize the right items
IQ9	Describe the current use of integrated processes in Business Banking the benefit of it ?
Ans9	I think integrated processes allows us the ability to have a fully automated process. Through having integrated processes it allows us to have a fully automated process so that we have everything managed and facilitated through a system. It leaves little leeway for deviation in the process because if our process are integrated there's set paths or set routes. And we are able to make sure that through that our SLAs are adhered to , so turnaround times are tracked. I think it also boils down to having that full data set or data lineage when we have integrated processes. Because of the level of integration that we currently have our reporting processes are actually automated. The benefit of having these integrated processes is that our capital teams can rely on systematic report generation as opposed to manual intervention. It also gives us the ability to repurpose staff.

IQ10	Describe the current use of flexible/adaptable processes in Business Banking and the benefit of it ?
ANS10	I think with the technology that we have from a flexibility perspective one of the offerings we want to have is that proactive engagement with the customer. So we can upfront look at different strategies for the customer when the customer goes into distress , get various options or solutions to manage the client position before the client hits distress. The customer engages with us on a single platform and if the client journey was supposed to be an unassisted journey where they are in control of what they are applying for. The customer can move off the unassisted rails to the assisted platform where our staff can intervene. It gives you the option to be in control and if you need assistance you can move off that rail and with manual intervention and we can guide you.
IQ11	Describe the current use of automated decision making processes in Business Banking and the benefit of it ?
Ans11	We have credit scorecards and currently we have the ability to automatically retrieve info from bureaus, we pull various sources of information from our databases relating to customer behaviour, account stats, just pulling various sources of information that feeds into the scorecard that gives an ultimate decision to your credit application. Also of that decision we systematically pay funds into the client's account. We have various rating models that's also in support of that credit application in which we need to assess the risk of the client. The banker would capture some fields and then it generates a risk rating for that client that's used as input into the credit managers decisioning process. From a fraud perspective we have indicators in our system where upfront we can decline an interaction the client wants to make with the bank if they are fraud suspects
IQ12	Tell me about other transformational concepts you see being used?
Ans12	OCR and robotics

Workforce Impact	
IQ13	Tell me how would you describe the changes to the current working environment as a result of digital transformation?
Ans13	

	I definitely see a change in terms of skills required whereas we would have a fairly large administrative base as a bank that is reducing quite drastically. There is definitely a drive to make sure that the skills we are looking out for is more relevant in terms of an industry 4.0 environment. The behaviour that we are driving is also changing in that people are encouraged to not print forms. Everything needs to be done on systems. Simple things like removing printers becomes a reality in our space because nothing should be manual anymore. And then your skills as an employee needs to be more than what you are hired for. You cant come into the bank and think that I am a banker and that's all. You need to have a different mindset. You need to have a technology mindset. You need to have a solutioning mindset. There's a change in how you do your job. Its making sure I do more and understand more than what I need to know.
IQ14	Tell me how would you describe the changes to job profiles as a result of digital transformation?
Ans14	You would hardly see recruitment post for an administrator because we need to repurpose and make sure we upskill our current administrative roles into roles that are more relevant. So one of the drives within business banking , where we do have admin intensive areas we are looking at making sure they can use udemy or other training offerings that can give them the skills that they need to apply for other jobs. With automation, data and robotics, all of those topics we are looking at, an admin role does become a very scarce need.
IQ15	Tell me what do you see as the opportunities for the workforce as a result of digital transformation
Ans15	The big opportunities is in upskilling people that thought im an administrative clerk that's their daily job, I just recapture what was captured onto a manual form onto a system. From that perspective there is a lot of opportunity to give people enhanced skills. It doesn't take away from the fear that they are feeling especially for the more mature workforce. All of these changes is a bit frightening however it does give the opportunity to explore new roles. And for people who didn't have the opportunity to go to varsity the bank can offer certain certificates or courses that staff can go on to enhance their skillsets and push them into a career that they never thought was possible. Those that are willing to learn and adapt there's the opportunity to invest in them and open up doors or careers that they thought was not a reality.
IQ16	Tell me what do you see as the threats to the workforce as a result of digital transformation?
Ans16	

	With the mature workforce, there is a lot of knowledge that sits within that group of people. So when we forcing these new technologies and new ways of work on them it does create a lot of hesitation and fear because they think that their skills is not needed anymore. And what we also tend to do because its new is think that I don't need the lessons from the past which is a very big mistake because they actually do have a lot of knowledge that should be taken into new technology. The threat is the knowledge gap that we don't exploit enough.. The threat for me is that the more digital we become , I see a difference in the change of ownership with what we are doing because there is so much reliance on the system . if you were an accountant before for example before you had to manually reconcile your books and now if you have a system that's just going to manage that for you your ownership , or how much you actually invest in what you are doing is reduced because you are not fully accountable.
IQ17	How have you seen the workforce adapt/take to digital transformation concepts?
Ans17	For the younger workforce there's a lot of motivation for working on new projects. The minute you say work on this digital strategy for example , there's a lot of excitement , there's a lot going on from the younger workforce. Whereas your more mature workforce will be very hesitant and say I'm not going to see this through. This is all dreams and I don't see how its going to work. So there's definitely that polar opposite. In saying that the people that are impacted by this is your product owners that push this journey really hard because they know what the strategy is and will impact the banks revenue for example. And on the other hand there are people who think how is this going to affect my job and those are the ones that will resist. So I think change management moving into industry 4.0 is critical. If you are not managing expectations properly its either going to result in those very ambitious workforce being demotivated because they are not seeing their project get through or there seems to be no progress in terms of landing their project because we don't have enough skills to land it. Or what they thought they going to deliver is what is being delivered. Managing that expectation and on the other hand where people think their jobs are going to be lost to say no this is what is planned for you. So that you can actually get everyone on board and working with the same strategy.
IQ18	In your opinion describe what further needs to be done to ensure that the workforce is able to perform in an ever changing digital world?
Ans18	So one of the big things for me is the awareness. Its one thing to have an idea of what the banks strategy is and a different thing understanding how we are going to meet that strategy. I think making sure that strategy is

	understood and communicated to everyone is important. I think making people understand what all of these concepts are is also very important. Sometimes you are so caught up in getting through your normal job. Not everyone has the ability to read up about these concepts. Even if they do read up there isn't that support structure to say what does it do mean for us. If I look at our team for example, the last time we spoke strategy was at the beginning of the year. When we had very high level discussions and I realised I don't know if you guys know any updates further to that. That is a big thing to make sure your team is on board with what the strategy means and make sure that the team understands how they are contributing to that strategy is also a very big topic. If you understand how your day to day job is leading the bank towards this strategy that's a motivation on its own. I think its just making sure that people understand it because if you understand it you wont fear it as much. And I think also managing the messages. As a segment we do that quite well in that we know our strategy is digital but we are also managing the staff element around it in that we are not being insensitive to the fact that when you read on the news branches are closing down that it becomes a celebration. Its converting that strategy into understandable pieces. The one thing we have is that sharepoint where we can download some of these presentations that are done and that strategy or roadshow we had earlier this year. Because not everybody gets to see that level of detail when we talk strategy We also need to make sure we equip our staff with the right skills because that's the only way we can look after them

Field Notes for Participant 2

Disruptive Technologies	
IQ1	Tell me how you would describe the current use of disruptive technologies in Business Banking ?
Ans1	• Disruptive technologies are used from a digital offering point of view for customers. • The use of big data for predictive modelling is also key to internal processes as well as offering clients products based on their behaviour. • Integrated systems allow for consolidating of data to achieve this.
IQ2	How would you describe the importance of embracing disruptive technologies in Business Banking?
Ans2	• Enhanced customer experience • To remain relevant and competitive in terms of keeping existing customer base and targeting new clients. The below can be used from a workforce perspective "the workforce is becoming younger and your new talent is looking for new challenges. We are seeing that the younger staff is not really interested in legacy capabilities, they do want to work on the new technologies, they want to work on strategies. In a market that is short on skills, if we are not changing our technology as a bank that also has a big impact on our skills retention"
IQ3	What do you see as the key disruptive technologies in Business Banking and how are they currently used?
Ans3	• From an automation perspective the credit value chain is almost fully automated such that there is little to no staff interaction (also can be used within workforce impact questions) • We make use of big data to read customer data and perform recoveries and collection management within credit. • The data is also used to track customers and improve offerings • Data analytics has helped to reduce activity time on our systems by addressing pain points experienced by users (use this for workforce impact)

	• Data has also helped to understand which areas of business experience issues and where training needs to be done (use this for workforce impact)
IQ4	Describe how other current technologies and technological concepts have an influence in changing the way this business operates?
Ans4	• OCR will change the way we do business. • Robotics is being explored within credit systems

Front line and Back office impact	
IQ5	Describe how we add value for the customer by using these disruptive technologies in terms of the solutions/products/ services produced?
Ans5	• Disruptive technologies is used to offer client centric offerings. • It gives the ability to make offers quick and improve turnaround times. • The staff needs to support the strategy for a client centric approach through the use of technology (can be used for workforce impact)
IQ6	Describe how we add value to our processes by using these disruptive technologies
Ans6	• Decreasing manual intervention reduces the time taken to do tasks (can be used for workforce impact) • Building intelligence into systems reduces the need to recapture information and allows for more reuse of data (can be used for workforce impact) • Using the data we can enhance systems • Using automation, robotics and OCR will assist with this as it decreases the reliance on manual intervention(can be used for workforce impact)

Digital transformation	
IQ7	Tell me about the digital transformation strategy within Business Banking in its current and future state in terms of digitizing processes and operations?
Ans7	• We are fairly advanced , there is minimal space for manual work • Key strategy from a digital point of view is consolidating systems (this talks to integration and interoperability).

	• Customer facing elements are digital and we are moving toward digitizing more products • The strategy is also for staff to be involved in the process to ensure that from the time clients interacts with us that it is fully automated in terms of processes (speaks to workforce impact)
IQ8	What further do you believe needs to be done for us to speed up this transformation process?
Ans8	• Need to understand the digital strategy and prioritize projects dealing with this. • There will need to be a big mindset change in order to achieve this • There is new skills that is needed in order to have successful digital transformation from a technical perspective (can be used for workforce impact) • Diversity of skills is needed for digital transformation (can be used for workforce impact)
IQ9	Describe the current use of integrated processes in Business Banking the benefit of it ?
Ans9	• Integrated processes allows us to have the ability to fully automate processes • Everything can be managed and facilitated through a system • SLAs can be adhered to and turnaround times tracked. • Allows for data lineage. • Integration allows for reporting processes to be fully automated. • Capital teams can rely on systematic report generation as opposed to manual intervention (can use for workforce impact) • Gives an advantage of repurposing staff(can use for workforce impact)
IQ10	Describe the current use of flexible/adaptable processes in Business Banking and the benefit of it ?
ANS10	• Proactive engagement with the customer • Customer can engage on a single platform. • Customer can move off unassisted rails where staff can intervene (can use for workforce impact)
IQ11	Describe the current use of automated decision making processes in Business Banking and the benefit of it ?

Ans11	• We have credit scorecards and can pull various sources of information on client behaviour in order to make an automated decision • Funds can be systematically paid out to a clients account • Allows for accessing risk of the client • Banker captures very little information and then a risk rating is generated for the banker and credit managers (can use for workforce impact)
IQ12	Tell me about other transformational concepts you see being used?
Ans12	• Spoke about OCR earlier

Workforce Impact	
IQ13	Tell me how would you describe the changes to the current working environment as a result of digital transformation?
Ans13	• Change in skills required • Administrative base of workforce is getting less • A different behaviour is being driven such as not printing out forms and everything needs to be done on a system. This is being forced by removing printers on the work floor. • Employee needs to be multiskilled and have a technological mindset.
IQ14	Tell me how would you describe the changes to job profiles as a result of digital transformation?
Ans14	• There would hardly be a recruitment post for an administrator because we need to repurpose and upskill current administrative staff. • Giving employees training offerings that can give them skills for the non administrative jobs that they need to apply for. • With automation, data and robotics, admin roles become very scarce.
IQ15	Tell me what do you see as the opportunities for the workforce as a result of digital transformation
Ans15	• Big opportunities in upskilling staff and giving them enhanced skills. • Gives the opportunity to explore new roles • For people who didn't have the opportunity to study the banks can offer courses and certificates. • There is opportunity for those that are wiling to learn and adapt
IQ16	Tell me what do you see as the threats to the workforce as a result of digital transformation?
Ans16	• A lot of hesitation and fear is created for the mature workforce • We however need their knowledge from an SME perspective • The threat is that we don't exploit the knowledge gap

	• The treat is also in terms of change of ownership in what we are doing as there is so much reliance on the system • if you were an accountant before for example before you had to manually reconcile your books and now if you have a system that's just going to manage that for you your ownership , or how much you actually invest in what you are doing is reduced because you are not fully accountable.
IQ17	How have you seen the workforce adapt/take to digital transformation concepts?
Ans17	• for the younger workforce there is more motivation to work on new projects • the mature workforce is very hesitant • change management moving into Industry 4.0 is critical (can be used for question 18) • managing expectations is critical for leadership • everyone needs to be aligned to the strategy
IQ18	In your opinion describe what further needs to be done to ensure that the workforce is able to perform in an ever changing digital world?
Ans18	• awareness needs to be created in terms of making sure the strategy is understood • staff needs to be equipped with the right skills through training

Participant 3

Interview questions for Research Project for degree of Masters of Science in Engineering (50/50)

Title: THE IMPACT OF INDUSTRY 4.0 ON THE WORKFORCE WITHIN A BUSINESS BANKING: PROJECTS AND OPERATIONS ENVIRONMENT

Student Name: JARED SUBRAMANIEN

(Student number: 576849)

School of Mechanical, Industrial and Aeronautical Engineering, University of the Witwatersrand

Demographics and Additional Information

Participant No:	3
Job Role	Solutions Head
Experience in current role	5
Experience in Business segment	9
Job Area	Projects
Experience with technology related projects	20

Background to Interview

1. Introduction to Industry 4.0
2. Purpose of research

Interview Questions

Disruptive Technologies	
IQ1	Tell me how would you describe the current use of disruptive technologies in Business Banking
Ans1	So if I look at DT there are a lot of concepts out there. There's this whole idea of big data, there's this whole idea of making use of big data. That being artificial intelligence. We work specifically with items like OCR and machine learning techniques. Then there's concepts like blockchain which I don't think is really a thing as yet in South Africa and in banking specifically. Robotics we do use in commercial. We use cloud in commercial. Voice not necessarily in business banking but more retail.

	I describe the use as immature, and what I mean by that is that all these technologies are brand new. These technologies yes they have been around for many years but the usage and actual implementation of this tech is still very new and immature.
IQ2	How would you describe the importance of embracing disruptive technologies in Business Banking
Ans2	If we don't embrace any technologies and of course disruptive technologies we are going to be in trouble. If you think of other new banks coming up, and our challenger banks are quite ahead of where we are with the new disruptive technologies. In our digital banking area, our challenger banks are planning on only being digital with no physical branches. We as a bank , a commercial banking unit, we need to stay relevant. We are a tech company , we are known for being a tech company , we are known for being the most innovative bank. There are many accolades we received over the years with our technology and our app and our online platforms. Again I think fairly immature but again we need to embrace it. In theory technology actually underpins all our capability as a bank today. So we have to embrace it , its part of our DNA. often when we speak about being relevant its how we use technology. So whether we use something basic from a tech point of view or whether we used more advanced machine learning type methodologies, its exactly that.
IQ3	What do you see as the key disruptive technologies in Business Banking and how are they currently used?
Ans3	Ai is quite a broad term. We can talk about a number of topics we use in AI and that's machine learning which helps up to predict certain things, to figure out certain trains within data and we have a whole science around it. Its termed data science and that is specifically what we do. AI and analytics are sub topics. You think about cloud computing, yes, we do make use of it. Again cloud is very new in South Africa. From a banking point of view we haven't fully embraced it as yet due to security regulations. Till recently we didn't have any SA based cloud facilities. There's a lot of constraints around POPI type information which hasn't yet been cleared with regulators like SARB. Items like internet of things , I don't think we use as well as a bank like other types of companies like insurance companies because they care about physical assets and the state of assets and the maintenance of assets. As a bank we haven't yet embraced that technology but we should. We should be keeping track, for example in our Agric space, of livestock, soil compositions, commercial properties. Because this is a new technology,

	things like sensors and chips are still very expensive. As a bank we do not keep track on our assets but we borrow on our assets. There is huge opportunity for IOT but we are not yet there. I don't think there is a drive for IoT Specifically in our area we make use of OCR, which falls under AI. There are quite a few OCR capabilities and I am currently implementing a project based on it. We make use of robotics in business banking. It gets used a lot in the retail bank because they have a lot of the green line processes. In commercial not as much. There's some value in it but more for the retail bank.
IQ4	Describe how other current technologies and technological concepts have an influence in changing the way this business operates?
Ans4	Of course when we think about tech we need to consider the pillars which is people, processes and data. Topics like FACT and Collate from a technology point of view it wasn't really a big thing in my opinion because all we were doing is modernizing and streamlining our processes. It was a big transformational project in that there was huge change management , there was huge lift in terms of people and process. From a tech point of view we needed to stay relevant hence the purchase of of the shelf packages. But it did a lot from a people point of view in terms of the way they operate, the way their ways of work change. People needed to reskill and upskill themselves and use new ways of thinking. We changed quite a lot in the bank in the last five years. I don't think a lot of people see it that way but I do see it that way. Making processes more efficient and streamlining , and getting rid of redundant processes. That is what we are here to do and that's what saves cost in the bank . Of course the business model needs to be light weight, it needs to be fit for purpose, it needs to be modular. For example everybody uses CIS for customer information. It needs to be interoperable, how many of our old systems can speak to our new systems. Yes we are moving towards this platform journey but that takes time. It means decommissioning old legacy architecture to get on to new more up to date systems. Importantly we need to consider the lifespan. Example systems like FACT and Collate. In my mind there's ways we could have implemented it way better but its given what we know now. I think in time these systems will surely evolve as we get smarter on the things like workflow and try to make it more lightweight. Its always an evolution from a tech point of view. There needs to be a focus on data. We need to be a data driven company. But its about how we use that data. We need to invest in concepts like cloud and things like storage. We need to make use of concepts like machine learning and AI with our data which for now is very immature

Front line and Back office impact	
IQ5	Describe how we add value for the customer by using these disruptive technologies in terms of the solutions/products/ services produced?
Ans5	I think maybe to this question and maybe a suggestion on this. Me and you are project people and there are two parts to the customer. The first being business like credit and fulfilment, that's the first people that we service directly. But of course there's a knock on effect because our front line services our external customers. Internal customers we disrupt from a change management point of view. If you think about yourself as a customer and a user of the app. The app falls over when they do maintenance on the backend. The new capabilities on the app you can tap to pay, initiate carless withdrawals etc. Essentially that is what adds value. It needs to be customer focused so example when we built FACT and Collate we were customer focused and we were internally focused because we needed to resolve certain business problems. For our external customers we needed to think about how then do we enable our internal customers (frontline staff) so that they can service the external customers. We needed to focus on the data and we needed to be optimal in our technology. If I think about aspects like assisted and self assisted platforms, our external customers can do things for themselves on the app which is self assisted or assisted.
IQ6	Describe how we add value to our processes by using these disruptive technologies
Ans6	We spoke about being efficient, about removing redundant tasks and being cost and time effective. In loan origination we are looking at why do we need so many clicks on the screen, why cant we automate some of the integration stuff. The data can be already there when our internal customers log in which will require the user to fill in the minimal info. Its how we use the technology to be disruptive so that we can add value. I always had in my mind if we string together customer screens, and the data is there when the user logs on it will be good but the framework didn't allow for it and I don't think we can yet do that. There's other things we can do with workflow to be smarter and more efficient. We are limited by the usage of our technology.

Digital transformation	
IQ7	Tell me about the digital transformation strategy within Business Banking in its current and future state in terms of digitizing processes and operations?
Ans7	I think we are quite mature in terms of the strategy. We know where we want to be. We are all aware of the theory. We need to modernize, we need to be efficient. There's certain principles that we build to, like not building bespoke but building generic, building on platform. We've always had this generic strategy.

	The way we build out the future state is in the actual implementation of it. In my opinion I think we do things reactively but its because we are constrained by what the technology can do. In terms of our integration layer or systems, there's a lot of things that we wanted to do there but the vendor said its not possible. I'll make reference to the CREMs (Credit Risk and Event Management) project, there's so much of stuff that we want to do with our data and eventing and our triggers and build out on new technology like graph technology which essentially is a no sequel database. But I am limited by the platform team on the CREMs project because they don't have the infrastructure for the processing power required. How do we as a bank handle big data if this happens. We are slow to move this big ship. We need to adapt and that's the stuff that takes time. We use the analogy of us being a big ship when we try to turn and change strategy. If you think about it for example a small company with 5 people and you can outsource your data to big data like platforms. So you don't have these sort of issues. You can outsource your AI or do the stuff yourself and there wont be limitations. If I was managing a small area I would have got all my projects implemented. Because of our business model we take responsibility over our stuff but at the same time that causes the complexity in a big bank. That's the difference with new banks in that they don't run into these issues. We have to first fix them and then implement
IQ8	What further do you believe needs to be done for us to speed up this transformation process?
Ans8	From a people point of view its upskilling yourself. Its about remaining relevant. We need to share information. We need to learn. We need to fail and provide quick feedback. It is also important to work with the right people. Some of the work we do we partner with universities and external companies to make sure you are relevant. We in source what we can do and we outsource other aspects like RPA (robotics) as we are not specialists with the software and neither do we want to be. You need to create sort of a black ops team that is able to do something that nobody is really willing to do but also explore things and that is what the idea of my area is. If you put things into a project and follow governance processes Ill never be able to move forward. We have that concept in my team where we can explore and break and fix things quickly. We have our own testing environment to do that.
IQ9	Describe the current use of integrated processes in Business Banking the benefit of it ?
Ans9	Integrated processes are important. Integrated systems are absolutely important and we stick to our principles. I refer back to my days when you needed to do a full end to end processes and you needed to capture customer information 11 times. We timed it and we checked it and this was a process and a system thing. When we launched in 2017 we did one call to CIS and you never needed to capture that information. With the manual work people can make errors.

	With integration there is less room for error, less failures. There is less data points
IQ10	Describe the current use of flexible/adaptable processes in Business Banking and the benefit of it ?
ANS10	Yes and No. Pre Covid it seemed as though we were very slow to market, very slow to adjust, very slow to be nimble enough to change the process. During Covid it proved to me that we can do it as we changed processes, and systems. We got things to work quickly because we needed to. We didn't have the time and we made a plan. If we need to be if there is a crisis we can be flexible and adaptable whether it's a process or a system.
IQ11	Describe the current use of automated decision making processes in Business Banking and the benefit of it ?
Ans11	The immediate benefit is less human capital. You need less people. Your decisions are more consistent because if its an automated process there's only certain decision paths it can take. An example a credit scorecard is a decision making process. If your overlay machine learning and neural network (mimic what the brain thinks) then you can be efficient and quick to market. A lot of decisions in scorecards are also referred. Its automated however there is still some judgemental overview of it. That in my mind is not a fully automated process. We do this decisioning in the lower market but we need to get the values and number of applications up. Some of the CREM work we are doing now is exactly that . We are trying to mimic neural network and make a decision judgementally taking in a bunch of factors.
IQ12	Tell me about other transformational concepts you see being used?
Ans12	I do think we make use of 4IR technologies but some to a lesser degree. We make use of robotics but not to the extent that some engineering companies would use it. Our robotics is digital workers that we are creating. It is still very new and basic as it only deals with the green line processes. A few bots that we built for FACT, those Bots fell over as the system is too complex with the processes it has. It was too difficult for a digital worker to figure out. Some of the new stuff we want to do is image recognition. So potentially if you walk into a branch it already knows who the individual is through face recognition. The front line staff will then already know who you are and are able to link your information to CIS and home affairs. To some degree we

	use some of the new tech a bit better than others. With OCR my team is advanced but the rest of the bank is not in the implementation of it. Neural network, RPA, voice are the other important aspects going forward

Workforce Impact	
IQ13	Tell me how would you describe the changes to the current working environment as a result of digital transformation?
Ans13	There's much change happening and the change is ongoing. There's the people aspect in which they need to be relevant, reskilled and redeployed if need be. There is also the process aspect. There is a lot of change to process because we are constantly trying to be efficient. We put in the FACT system 3 years ago but we are already trying to make it thinner and lightweight and make it more modular as we try to work more efficient and more agile. The end result of all of this is the data , with the data we realize more things and it gives us more information. If you think about the theory of 4IR, with this comes the knowledge economy and data comes from information hence we are terming it now the knowledge economy. That's the cycle of it. Using the Covid period as an example we built smart models to determine turnaround times and find out where the bottlenecks would be. We predicted which areas will fall over for example fulfilment and credit and we built some digital workers in the fulfilment space.
IQ14	Tell me how would you describe the changes to job profiles as a result of digital transformation?
Ans14	Its about people remaining relevant. Example , and I say this to my sister as a chartered accountant in that a few years they wont be relevant because standard accounting procedures. My robotics and machine learning can do the same tasks easily. For me, job profiles that we have today will definitely not be the same in the future. If you think about the top paying jobs right now, almost every single title or domain has the word data in it. There's a data scientist, and a data engineer and a data architect. Its all linked to that. There's still the other aspects that you need. You need SMEs who know and understand the business. Those roles will never go away because there is no substitute for experience. Sometimes we rely on person X because he has the history and background and experience. For you and I that are young enough and still have many years to work, we have to transform with the times. We need to remain relevant and study and keep up to date with things like IoT. The people that's not going to remain relevant and don't do their research and don't know what's happening with technology will be left behind. They will essentially become redundant. The main driver is to become efficient, it is not about hiring and firing people. We make use of technology to do that. For example between the integration of the FACT and IDS systems you don't have people capturing and re-capturing and checking. It creates efficiencies that's the main thing.

	The by-product of that is that you don’t need as many people as you needed before in fulfilment. I think of person Z for example, we have repurposed him so that he deals with data quality across the bank. At the same time I rely on him a lot to do stuff in which he is the SME on. That is how he has remained relevant because he is up to speed with data quality and what it means.
IQ15	Tell me what do you see as the opportunities for the workforce as a result of digital transformation
Ans15	There’s of course knowledge opportunities. You may find that you are strong in a certain topic that you did not know of before. There’s opportunities for small business. I know of 2 people that were in corporate before but started up business doing AI and IoT stuff. They didn’t wait to become redundant. They moved early in the market and realized that there is opportunity
IQ16	Tell me what do you see as the threats to the workforce as a result of digital transformation?
Ans16	The only threat is if you don’t keep yourself relevant then you become redundant. If I am sitting this side of the fence (manager role in a solutions space) then it is not really a threat but for the general workforce it is a threat. The workforce needs to upskill themselves.
IQ17	How have you seen the workforce adapt/take to digital transformation concepts?
Ans17	The workforce take to it slowly. After every project release there are always issues around change management and people don’t know how to use the system, the don’t want to change and it takes time. Ill make reference to a presentation I did in which we reflected on what we did 4 years ago to date and if I look at something basic like turnaround times we used to take 120 days in year one for a certain application type and now it is down to about 40 days. That shows that it has taken 3 to 4 years for the workforce to get used to the system and start using the system because there were many times they were still doing things manually even after we implemented the project. There’s a resistance to change and transformational ideas. Ill make reference to the S curve. You get the people that are completely resistant , then you get the people that are adapting, then you get the people that are completely adaptive and ready for the next step. Its those pockets of people that you need to manage differently. In my opinion in a Business Banking space, its been slow but consistent.

	I also think that as long as the leadership team is enforcing that change is normal, it has to happen, then the rest of the ship will move and adjust accordingly.
IQ18	In your opinion describe what further needs to be done to ensure that the workforce is able to perform in an ever changing digital world?
Ans18	We need to support the workforce and its important that the leadership team has that structure to enable the workforce to reskill and upskill. A lot of it is on yourself as a worker. You can't say in 2 years I'm out of a job, I'm redundant. it's on yourself to remain relevant, educated and to see where your next opportunity is. It's also on the leaders of the business to make sure their teams are working with the new technological projects.

Field Notes for Participant 3

Disruptive Technologies	
IQ1	Tell me how you would describe the current use of disruptive technologies in Business Banking ?
Ans1	• Immature usage • We use big data and AI, but not so much blockchain
IQ2	How would you describe the importance of embracing disruptive technologies in Business Banking?
Ans2	• To remain competitive • Challenger banks are ahead • It underpins our capability as a bank • To keep an industry standard
IQ3	What do you see as the key disruptive technologies in Business Banking and how are they currently used?
Ans3	• AI and machine learning to predict things • Haven't embraced cloud fully due to security regulations • Don't really use IOT • Use OCR which is part of AI
IQ4	Describe how other current technologies and technological concepts have an influence in changing the way this business operates?
Ans4	• we need to consider the pillars which is people, processes and data • it did a lot from a people point of view in terms of the way they operate, the way their ways of work change. People needed to reskill and upskill themselves and use new ways of thinking. We changed quite a lot in the bank in the last five years(can be used as part of answer for question 15)

Front line and Back office impact	
IQ5	Describe how we add value for the customer by using these disruptive technologies in terms of the solutions/products/ services produced?
Ans5	• Creating a better client experience through digital solutions (saves client time and money) • Use data from tracking the customer's behaviour to influence products offered or decisioning from a back end perspective such as credit decisions.

IQ6	Describe how we add value to our processes by using these disruptive technologies
Ans6	• Reuse of data

Digital transformation	
IQ7	Tell me about the digital transformation strategy within Business Banking in its current and future state in terms of digitizing processes and operations?
Ans7	• Mature in strategy but slow in implementation
IQ8	What further do you believe needs to be done for us to speed up this transformation process?
Ans8	• Need to upskill employees • Need to partner with the right organizations
IQ9	Describe the current use of integrated processes in Business Banking the benefit of it ?
Ans9	• Reuse of data • Less room for errors and failures.
IQ10	Describe the current use of flexible/adaptable processes in Business Banking and the benefit of it ?
ANS10	• We are able to adapt from a systems and process point of view
IQ11	Describe the current use of automated decision making processes in Business Banking and the benefit of it ?
Ans11	• Less human capital • More consistent decisions
IQ12	Tell me about other transformational concepts you see being used?
Ans12	• Neural network, RPA, voice are the other important aspects going forward

Workforce Impact	
IQ13	Tell me how would you describe the changes to the current working environment as a result of digital transformation?
Ans13	• Bottlenecks can be identified to improve productivity • Employees need to constantly upskill themselves
IQ14	Tell me how would you describe the changes to job profiles as a result of digital transformation?
Ans14	• SMEs are relevant • Redundant tasks will be eliminated • Repurposed to higher roles
IQ15	Tell me what do you see as the opportunities for the workforce as a result of digital transformation
Ans15	• Knowledge opportunities
IQ16	Tell me what do you see as the threats to the workforce as a result of digital transformation?
Ans16	• Threats to employees unwilling to learn
IQ17	How have you seen the workforce adapt/take to digital transformation concepts?
Ans17	• Resistance to change and slow change management
IQ18	In your opinion describe what further needs to be done to ensure that the workforce is able to perform in an ever changing digital world?
Ans18	• Leadership role needed in supporting the workforce

Participant 4

Interview questions for Research Project for degree of Masters of Science in Engineering (50/50)

Title: THE IMPACT OF INDUSTRY 4.0 ON THE WORKFORCE WITHIN A BUSINESS BANKING: PROJECTS AND OPERATIONS ENVIRONMENT

Student Name: JARED SUBRAMANIEN

(Student number: 576849)

School of Mechanical, Industrial and Aeronautical Engineering, University of the Witwatersrand

Demographics and Additional Information

Participant No:	4
Job Role	Operations Head
Experience in current role	4 years
Experience in Business segment	9 years
Job Area	Operations
Experience with technology related projects	9 years

Background to Interview

1. Introduction to Industry 4.0
2. Purpose of research

Interview Questions

Disruptive Technologies	
IQ1	Tell me how would you describe the current use of disruptive technologies in Business Banking
Ans1	In Business Banking we seem to be more focused on automation rather than the other newer disruptive technologies. When I talk about automation, if I look at our credit space and transactional space , there’s a huge amount of capacity going into projects to automate functions typically done by large back office staff. There is huge potential to use the newer disruptive

	technologies but I have not seen proper AI solutions, there are talks about virtual reality and blockchain but I have not seen much impact of this in our current solutions in Business Banking. I would describe it as mature in some areas but non existent with the newer disruptive technologies.
IQ2	How would you describe the importance of embracing disruptive technologies in Business Banking
Ans2	Customer experience is our current buzzword of the day. So customers want to be recognized by who they are and how they are behaving. They are also become further entrenched with technologies incorporating IoT principles. These technologies have actually made the world smaller. So it has given customers the platform to hunt for the best services on a wider scale. As our larger corporates are going into buying in smaller countries its clear that our competition is not just local anymore. Companies such as Alibaba and Amazon have made it clear that borders don't matter anymore. Cryptocurrencies and overseas financial institutions have made it more easier for people around the world to invest offshore taking into account the regulatory restrictions. It is still a lot easier to do now than it used to be before. Its important that we keep up to speed with this technology. Even if our reserve bank allowed more international influence in our local market and digital banks, we are very likely to find customer attrition in our space. Very important, particularly because of customer experience.
IQ3	What do you see as the key disruptive technologies in Business Banking and how are they currently used?
Ans3	Outside of automation we are seeing very little implementation of the others. Reason being is that for many years we have not upgraded our underlying systems and we didn't incur that technical debt in time. We are playing a lot of catch up. We only very recently starting to move toward building data competencies and creating the right architecture to support a data and AI strategy. We are however still playing a lot of catch up because the world is already moving forward with quantum computing to enhance these solutions and make them faster and more accurate. We do place a lot of focus on automation. We place that focus on items that use a lot of manpower and capacity in our back offices. We are also doing this to give more capacity to our customer facing staff so that they can focus more on customer interactions that actually require human interventions. Unfortunately when it comes to cloud computing , we don't employ cloud computing in our space. We talk around image recognition technology but it is just not where it needs to be. Another big part of that is employing the right resources within the segment. With data analysts back in the day it was sufficient just to be a business

	intelligence resource and these are the same resources now that are moving into higher roles. What we need is actually a stronger skillset , employed from outside the bank, bringing new thinking within that space so that you have enough diversity in these discussions. That's what I mean by diversity, if we only have old people or people who have only ever worked at this current bank then how do you invite people that have a wider set of thinking. It's important that when you talk about big data and AI , that you create larger and diverse teams to bring more thinking into it. Similarly for IoT. In terms of IoT we have touched on it to an extent. Our app is trying to create a market place and bring things together. Especially in the Covid environment we had a functionality on the app so that you could track your symptoms which was open to employees and customers. We are heading there, I just think that we are not there yet because there is still so much of automation that needs to be done and which needs to be a base for a lot of these things.
IQ4	Describe how other current technologies and technological concepts have an influence in changing the way this business operates?
Ans4	As a segment its not that we are unaware of these technologies and these fintech companies and the risks that they bring. I think we are very much aware. If I look at our X journey as a bank and the programmes that we have in place its set up as a strategy to tackle some of these things. If we look at blockchain, we may not have blockchain in the traditional sense of it however we are in the process of creating contracting platforms. It becomes a need to create a platform for contracting not just for us but for other customers and suppliers within the bank. Unfortunately a lot of that infrastructure is dependant on what government can bring forward as well. A lot of potential for growth in these technologies is limited by our government infrastructure. You can see with the introduction of the Natis system for cars, it was to use that technology and have links to that technology to be innovative around it which is what part of the vehicle finance segment did in the bank. Last year there was new legislation passed under the electronic deeds registry and we are planning to do a similar thing with that. Once its deployed into the country we can consume it. What we are really good at is consuming things quickly when they land. Unfortunately as a bank your hand is tied with having to deal with industry solutions and the pace at which industry solutions and industry adopted solutions, which we are regulated to adopt, do land. We have started building teams that can now perform quick builds and rapid prototyping. We did something similar with our Covid response where we have a team that developed and deployed functionality in a record time.

Front line and Back office impact	
IQ5	Describe how we add value for the customer by using these disruptive technologies in terms of the solutions/products/ services produced?
Ans5	Very recently there was quite a bit of media around the Manilla project. It is a regulatory based project. It is a robot that compiles a process and takes about 8 seconds to produce a report whereas it used to take about a week before. We in Business Banking are taking these solutions implemented by the group and starting to adopt them. That as an example creates more security for the customer. Security in the sense that as a bank we are ensuring that the flow of funds within the banking group are legitimate and money laundering activities are not being performed. Another example is automation from a customer experience perspective we try to get a few solutions out of that. One is that you want to derive information instead of asking the customer for it. It makes the experience better. We then have quality at source with the data as we are not asking the customer more than once for information. It eventually builds up the database that can create the foundation for technologies such as AI and utilizing Big Data efficiently. Quicker turnaround times and a smoother customer experience is how we are also adding value.
IQ6	Describe how we add value to our processes by using these disruptive technologies
Ans6	Its quicker and also reduces the boredom in employees. I think a lot of them have been doing the same thing for so long , and while it might be uncomfortable to them to do something new, it also gives opportunity to utilize that capacity elsewhere. By automating something you can start to place more focus on higher risk processes where you didn't have enough man power to do it before. So the Manilla project is a perfect example. The report is being generated by the robot which used to take so long to do before. Now you can have the same people that used to develop that report rather analyse the outputs and see what this report is saying in order to take an informed decision that the robot has not taken. Historically what you used to see was that there was a lot of quality errors in the report and you are taking wrong decisions on bad reports. Now you are getting a quality report and as an employee you are now doing for fulfilling work which is applying your mind to a set of outputs as opposed to creating an output that should be automated.

Digital transformation	
IQ7	Tell me about the digital transformation strategy within Business Banking in its current and future state in terms of digitizing processes and operations?
Ans7	I think our transformation strategy is set. I think the time to effect it is what we are struggling with. We have this X journey and been on it for some time. We definitely have some of the more mature areas like our credit space in terms of digitizing our processes and operations. I do think it is something that is a little slow. Slow in terms of by the time we implement it becomes redundant. I did some research on credit card and the potential that people can speak English in our country is very little. As much as I have seen focus on secure chat and trying to create models for them , I have not seen any initiative to broaden the scope into more languages in South Africa. We do bring in digitization but we are not really bringing enough for that end customer experience. If most of our customers are illiterate and in rural areas that it is difficult to deliver a card to. Why are we focusing on our delivery strategies when people are able to pay with their faces in some countries. We have to be cognisant of our country's landscape otherwise what you end up doing is servicing a market that's only 5% of the wealth in this country. There needs to be more alignment between the digital transformation strategy and our actual customer base. We are focusing on tackling our existing customer base as opposed to our potential customer base.
IQ8	What further do you believe needs to be done for us to speed up this transformation process?
Ans8	We need to move quicker onto data structures from a people and architecture perspective. We do need a fresh mindset so that change does not sound so radical. It may be to a lot of other people. There needs to be more openness to embrace fintech companies or contracting specialists from outside in an effective manner and move away from building everything in house. There's definitely a time , a place and a reason to build in house. Your AI solutions should never be fully outsourced because you lose your competitiveness as a result. Contracting and being smart around it and employing the resources that have the knowledge from outside rather than waiting for people within your organization to build that knowledge is definitely something required in order to speed it up.
IQ9	Describe the current use of integrated processes in Business Banking the benefit of it ?
Ans9	I think our credit space is a great example of integrated processes as well as gaining huge benefit from it. Historically we used to do the stuff of paper and have misaligned processes. I have a team which started off with 240 employees nationally , in different provinces. When I first got here in 2016 it was very clear that everyone was doing different things. Being on automated platforms has definitely helped standardize processes and being

	cognisant of what are the true nuances in each of those areas. What’s interesting is that the nuances pertain to customers and customer behaviour and how it differs around the country. It was really interesting to know that and we wouldn’t have known that if we were not on integrated processes. We are now starting to create proper data at source. As we improved on these technologies we obtained quicker turnaround times and there is also a transparency that never existed before. There is transparency not just for the customers but for employees along the entire value chain. I think historically as a back office we were always blamed for delaying credit and pay-outs. Now that we are seeing the data we realize that it has never been the back office but actually the conversations with customers that take the most amount of time. Another example of how we use Big Data, definitely at infancy stage, but we are already starting to see that models are more accurate when it comes to capital and provisioning. We are saving a lot of money and we are not really providing bad debts for customers when they do go bad. We have a lot more data then we used to and that’s what helps to achieve that. We are currently at infancy stages but as the architecture gets better there’s definitely plans to be a lot more responsive to changes in customer behaviour.
IQ10	Describe the current use of flexible/adaptable processes in Business Banking and the benefit of it ?
ANS10	Again our judgemental credit processes is a very good example of this. What we find as one of the most difficult things to standardize the system is that our judgemental credit teams are very quick to respond to changes in the market. Designing a system that can be as responsive has definitely been a big challenge. I think we are a little slow on it. But we definitely see that there are systems and processes that are quick to change. With Covid we had to respond and do our duty as a bank to service the country and make changes to fee structures. We definitely saw that one system outperformed the other in terms of its flexibility and adaptability. The difference between those systems is that one was outsourced and the other built in house. If I look at FACT, which is an outsourced system, at a person level it supports a process that is very flexible and adaptable versus CAS which is very rule orientated and is flexible to respond to changes in the market but in terms of allowing too many interventions it doesn’t really cater for that. I think that when we talk flexible and adaptable there is a people element and a system element that what we need to do is get better at aligning the both. In Business Banking I think only because we have these systems we are flexible and adaptable in both people and processes. Quick development, rapid deployment and agile prototyping ,when we do need to and when it comes down to it, helps us as Business Banking to get it done.

IQ11	Describe the current use of automated decision making processes in Business Banking and the benefit of it ?
Ans11	The one that immediately comes to mind is scoring a customer for credit. The benefit of it is that there is an automated decision and you don't need a set of eyes. The next thing is that it is a standard answer so that you remove that element of bias and the chance for error. We are looking at other automated decisions within this space. For myself I am focusing on image recognition technology so that when it comes to looking at documents I don't have a set of eyes looking at documents to make sure that everything is in order. Scoring definitely adds big benefit. It definitely helps to have that extra capacity whenever there is a problem with the scoring engine and it starts referring more applications for a set of eyes to see. This definitely creates more work in my space. There's a lot of projects to enhance it because of the amount of headcount capacity benefits we can get from it is phenomenal.
IQ12	Tell me about other transformational concepts you see being used?
Ans12	Nothing really other than what we have chatted about. We are starting to touch on image recognition but it is still in its early days.

Workforce Impact	
IQ13	Tell me how would you describe the changes to the current working environment as a result of digital transformation?
Ans13	The focus areas have been the back offices with a view to move toward client facing staff. It is changing in the back office rapidly. Stuff that people used to be done manually has been automated and the employee may feel that this was done too quickly, however it has taken some time, in order for them to upskill themselves. What is important is the landscape of skillsets that exists within these individuals. Back in the day we employed people that had left school or matriculated from school and have done back office and very manual administrative jobs. We never pushed them into upskilling themselves further. I do think there is a lot of anxiety around transformation but there is definitely more automation which is challenging for us as leaders to try and remove that anxiety and get them to replace it. More standardization with digital transformation which we didn't have before.
IQ14	Tell me how would you describe the changes to job profiles as a result of digital transformation?

Ans14	As leadership we have to spend a lot more time dealing with complexity. There was a lot of focus on IQ and that change has vastly moved to EQ. When you have a workforce that sees that work is getting a lot less or people are disappearing around them , you need a leadership that will calm them down. The strategy of management is to never cut jobs. The issue is that the education levels of people in South Africa and it is hard to find job roles for the future workforce with this limited education. For example in my space, when I came into this team I had purely operational staff. That was a challenge because there was a lot of work that needed to be done from a project perspective. It just required me to move one person from their day to day job into a role for solutioning to create that change to say that you’re not going to look after people and do the back office work anymore but work on solutions. That solutioning team has grown arms and legs since then. As we see people leaving we don’t fill those spaces with permanent workers but we fill them with contract workers so that they can get used to the technology. Before people get anxious however what I would do is move them to a solutioning team so that they can gain that knowledge to wok with technology. The job profile landscape is shifting towards systems and data. There’s definitely a need for people to be more agile. For those that are still behind their job profiles are changed to be more agile. From administrative to the management team agility is extremely important to adapt. It was not a requirement before digital transformation.
IQ15	Tell me what do you see as the opportunities for the workforce as a result of digital transformation
Ans15	New job roles and doing something a little different that you have not sone before. There’s definitely a lot of people that do not want to do that. We have seen a lot of staff that do not want to change because they are scared of change. For those that want to embrace the opportunity they have the opportunity to reinvent themselves. There’s opportunity in the creation of new job roles or spend some capacity that they get the experience necessary for the new job roles. This is important because some of their roles will become redundant. Its about giving the opportunity to the employee. So boredom that they have had for any years, the mind shift change is there to see that I don’t need to progress upwards in a hierarchy in order to progress as an individual. I can move laterally or downwards and still upskill myself as an individual and have job security. For those that do remain behind I think that the work left for them will give them better pride in their work because they will be doing things that a robot can’t do. There is then focus on their SME knowledge that they built up over the years.

IQ16	Tell me what do you see as the threats to the workforce as a result of digital transformation?
Ans16	It will be retrenchment. It will also be the unwillingness to learn. We have given the team training licenses and many of them refuse to use it. They are not interested in upskilling themselves. It is very hard to manage those individuals who have no intention of improving themselves. I do not think that this new age has any appetite for people that do not want to constantly improve themselves. The other threat is that even if you give the people the tools to upskill themselves, at the moment who is going to hire a data analyst that learnt about data via a training course. We are looking for data analysts and scientists that have degrees behind them. We are not looking for people for people who have done short courses. There definitely needs to be a change in our HR practices and how we advertise our job roles and creating job roles that are fit for people that have learnt skills very quickly through short courses. We need to be flexible on that as an organization because that is the way of learning in the future. You can start your degree but by the time you reach the end of the degree, the world is moving at such a rapid pace that what you learnt may be irrelevant. Traditional workforce planning and HR practices need to change. Its not impossible for people to develop and recreate themselves.
IQ17	How have you seen the workforce adapt/take to digital transformation concepts?
Ans17	After a lot of hard work from a leadership perspective I can see within my team that my workforce is a lot more open to it. I think anxiety levels are high every time a piece of functionality comes in and takes away work but it is important to continuously engage with them. For the larger group our automation has been so slow that in our front line and customer facing teams it is not as adaptive. There’s different groups of people and leadership needs to be cognisant of that. My team is very adaptive now versus a frontline team in our space.
IQ18	In your opinion describe what further needs to be done to ensure that the workforce is able to perform in an ever changing digital world?
Ans18	Leadership needs to remove hierarchies. It is about identifying those game changer individuals and giving them confidence to step up in this ever changing digital world. We have this spider web of engagements within or team and segment and not just engaging with ourselves but engaging to the

	wider segment. Where you can see one area is good at change management, you have a responsibility as a team and not just leadership to bring that thinking to the wider audience.

Field Notes for Participant 4

Disruptive Technologies	
IQ1	Tell me how you would describe the current use of disruptive technologies in Business Banking ?
Ans1	• More focus on automation than newer disruptive technologies • Resource capacity is going more into automation than AI for example
IQ2	How would you describe the importance of embracing disruptive technologies in Business Banking?
Ans2	• Enhanced customer experience • Competing with local and international organizations on a wider scale as well as competing with fintechs
IQ3	Literature has defined Automation, AI, cloud computing, big data analytics and IoT as key disrupters in the financial market. Tell which of these do you see as the key disruptive technologies in Business Banking and how are they currently used?
Ans3	• Outside of automation we are seeing very little implementation of the others. Reason being is that for many years we have not upgraded our underlying systems • Starting to move towards data competencies to use AI • Focus on items that use a lot of manpower and capacity in our back offices. Giving more capacity to our customer facing staff so that they can focus more on customer interactions that actually require human interventions • Cloud computing and IoT not used very much The below is more suited to workforce impacted: • We need to employ the right resources with specific know how. • Need a stronger skillset • Need to employ people from outside the organization with a new view on technology (diversity of employees and teams)
IQ4	Describe how other current technologies and technological concepts have an influence in changing the way this business operates?
Ans4	• Potential for growth for technologies in business banking is limited due to government regulations. • Trade off between industry solutions and meeting that standard and what the bank is regulated by

	The below applied more to the workforce impact: • Started created teams that can perform rapid prototyping and quick builds

Front line and Back office impact	
IQ5	Describe how we add value for the customer by using these disruptive technologies in terms of the solutions/products/ services produced?
Ans5	• Creating automated solutions to provide more security for the customer • Improving customer experience by obtaining data from customer behaviour to offer better customer experience and efficiencies rather than asking the customer for data multiple times.
IQ6	Describe how we add value to our processes by using these disruptive technologies
Ans6	Response talks more to the workforce impact: • Its quicker and also reduces the boredom in employees • Using robotics to perform a task allows the employees that were performing that task to perform other higher order tasks. • Reduces error and risk within processes

Digital transformation	
IQ7	Tell me about the digital transformation strategy within Business Banking in its current and future state in terms of digitizing processes and operations?
Ans7	• Strategy is in place however slow to implement • Focus is on tackling the existing customer base rather than new customers
IQ8	What further do you believe needs to be done for us to speed up this transformation process?
Ans8	• Move quicker onto data architecture • Fresh mindset required • Embracing fintechs • Outsource AI solutions
IQ9	Describe the current use of integrated processes in Business Banking the benefit of it ?
Ans9	• Credit space is a good example

	• Historically things were done on paper and there was process misalignment. • Integrated processes allow for building a central data source on which AI solutions and big data solutions can be built
IQ10	Describe the current use of flexible/adaptable processes in Business Banking and the benefit of it ?
ANS10	• This is a people and process element. We are able to adapt quickly because we are flexible in process and people
IQ11	Describe the current use of automated decision making processes in Business Banking and the benefit of it ?
Ans11	• Automated decisions for scoring a customer for credit • Automation in image recognition technology. A set of eyes is not needed to review documents • Automation creates extra capacity within areas • Automated decisioning reduces headcount on previously manual decisions
IQ12	Tell me about other transformational concepts you see being used?
Ans12	• Image recognition technology still at early stages

Workforce Impact	
IQ13	Tell me how would you describe the changes to the current working environment as a result of digital transformation?
Ans13	• Focus has been on changing the back office • Manual tasks have been automated • Broader skillset brought in • A need for people to upskill themselves
IQ14	Tell me how would you describe the changes to job profiles as a result of digital transformation?
Ans14	• Leadership plays a key role in managing transformation • Focus is on EQ rather than IQ • Difficult to fill the new job roles because of lack of education/skills • Back office staff have been repurposed to perform solutioning • More employment of contract workers in roles as they get used to the technology quickly • Job roles are shifting towards systems and data and the need for workers to be more agile. • Agility in administrative roles becomes necessary to adapt.
IQ15	Tell me what do you see as the opportunities for the workforce as a result of digital transformation
Ans15	• New job role creation

	• Creation of capacity for workers to gain the experience for new job roles through upskilling themselves. • Reliance is placed on remaining workers for the knowledge that they have built up over the years.
IQ16	Tell me what do you see as the threats to the workforce as a result of digital transformation?
Ans16	• Retrenchment • Loss of jobs for those performing redundant tasks • Lack of growth for those unwilling to learn and upskill themselves • There needs to be a change in HR policies for recruitment (this can possible be used for question 18)
IQ17	How have you seen the workforce adapt/take to digital transformation concepts?
Ans17	• Anxiety levels are high when new functionality takes over manual tasks • Leadership plays a strong role in giving workers the confidence to thrive • Teams need to be more adaptive especially client facing staff
IQ18	In your opinion describe what further needs to be done to ensure that the workforce is able to perform in an ever changing digital world?
Ans18	• Leadership needs to remove hierarchies and allow workers to step up and encourage them to step up. • Engagement needs to not only be within teams but across teams and the segment in order to grow and learn in digital transformation. • Change management is necessary

Participant 5

Interview questions for Research Project for degree of Masters of Science in Engineering (50/50)

Title: THE IMPACT OF INDUSTRY 4.0 ON THE WORKFORCE WITHIN A BUSINESS BANKING: PROJECTS AND OPERATIONS ENVIRONMENT

Student Name: JARED SUBRAMANIEN

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Demographics and Additional Information

Participant No:	5
Job Role	Business Solutions Head
Experience in current role	4 years
Experience in Business segment	14 years
Job Area	Projects
Experience with technology related projects	20 years

Background to Interview

1. Introduction to Industry 4.0
2. Purpose of research

Interview Questions

Disruptive Technologies	
IQ1	Tell me how would you describe the current use of disruptive technologies in Business Banking
Ans1	We have been using technologies for quite some time to automate business processes specifically in credit. So currently we are using score cards and models to make automated decisions in credit. In 2007 in Commercial there was no systems actually and everything was done manually. We are using data to calculate the customer’s risk positions and the changes in their risk

	positions. And CREMs is the true use of disruptive technologies in terms of how do we reuse scored facilities for example 0 – 60mil clients we are making automated decisions for credit reviews , for increases and pre-approvals. Just as important as the data is how you position it to the customer. It needs to be presented on one of our digital channels. We have been using a concept called triggers to recognize credit risk events and we are working on building out these events. We are now creating the loop. Previously we didn’t close the loop. We would make automated decisions and push these decisions and the data never learnt. So the machine now learns how to make decisions using the data. We are now reusing the input from the customer to trend what the customer is doing. The use of the systems will become less where the push will be purely on the channels. A lot of our systems have been decommissioned. We have decommissioned 12 or 13 systems. The data play is not only about the people it is also about the systems . So less reliance on the systems and more focus on the channels.
IQ2	How would you describe the importance of embracing disruptive technologies in Business Banking
Ans2	It is extremely important. Important in terms of being competitive but also to improve our cost to income ratio. We can’t employ more and more people all the time. We automate things and use that automated decisions in credit specifically . When we started scoring in 2007 we were getting the events going thereafter in 2008 , 2009. Then we had a worldwide credit fallout. The decision was made not to push those automated decisions and that set us back big time. To give you an idea what we have achieved just on automated decisioning . we had 430 credit managers in 2007, last year we had 209. We reduced the headcount from 430 to 209. The portfolio is now 5 times the size that it was. If we haven’t made use of these automated decisions we would have needed to employ 430 credit managers times 5. Based on all these automated decisions like triggers and preapprovals we now only have 209 credit managers. The intention is to further downscale as we learn from the data we have. Our most profitable product house is BCB. The entire model is automated decisioning, automated documentation, digital platform. That just show you how important it’s been since 2007. There were initially 5 people in the team and the team has grown exponentially in trying to automate these decisions and use these technology. The team who is making these automated decisions has shrunk almost a quarter since 2007.

	Embracing this was important and it has now become business critical.
IQ3	What do you see as the key disruptive technologies in Business Banking and how are they currently used?
Ans3	The current ones are scorecard models and automated decisioning and the new stuff that we are working on in self learning. One of the problems we had is that we cant change the model continuously , that is now the new thing we are doing in that the model is enhancing itself all the time. So we don't have continually update them. Only once every two to three years we rewrite them and improve them with the decisions we have learnt over the last 2 to 3 years. It is now about improving those decisions faster. Currently they are being used in FACT, CAS and digital channels. The other technologies like OCR where we are trying to read financial statements is something that we are trying to do. We scan the customer's financial statements, read the data that's in the statements, push them into the data warehouse and then we do the big churn to calculate the rations that are sitting there in the financial statements without a human being touching. From a business banking perspective that will be a huge benefit because we can use other sources to improve our models. The key disruptive technologies are the big data and outcome from that and how we use them now is to automate credit decisions and credit risk.
IQ4	Describe how other current technologies and technological concepts have an influence in changing the way this business operates?
Ans4	We haven't paid enough attention to the predictive analytics component. In other words what the customer wants and what he needs. We have being doing the push to the customer to say we think you want the credit card. We are not really like amazon and others tracking what the customer is actually looking for. We haven't made much progress in that regard. Other businesses like Amazon are good at it. We need to get better at it.

Front line and Back office impact	
IQ5	Describe how we add value for the customer by using these disruptive technologies in terms of the solutions/products/ services produced?
Ans5	We do have things like fundaba to help the customers operate their business better. Most of our business is around small businesses. They are about 65% of our business. How we add value to their life is to provide preapprovals via channel. Through our models we predict that the customer needs an overdraft and we position it to him. The value that the customer is getting is that his time is important. The customer says yes I want the overdraft and the funds will automatically pay into their account. Its probably about a 10 minute experience and the money is in the account. So value is clearly on

	customer's time as a business because a business person is about time. The value add is I have given it to you when you want it. Saving time for customers is critical and making the offer at the right point in time. So if we can predict that he needs an overdraft and we position it to him when he does then that is real value add.
IQ6	Describe how we add value to our processes by using these disruptive technologies
Ans6	The value add on a process is that it is automated. We have a look at the audits in the fulfilment team where we have a lot of manual intervention pushing applications through or generating documents. So once your system is in and your model is in and working the way it needs to and is predictive, then the process is automated and the room for error is less. So the value add on a process is all about accuracy , time and automation. Once it is working you improve the process and the room for errors is less. From an audit perspective we have standardized our processes. So it is also adding value through standardization and we don't have human beings making assumptions about what they should be doing.

Digital transformation	
IQ7	Tell me about the digital transformation strategy within Business Banking in its current and future state in terms of digitizing processes and operations?
Ans7	I think we are probably in our infancy with transformation. Some of the stuff we have worked on largely is from an operational perspective. The strategy has been for some time to automate routine jobs. That's where with automating processes and jobs. Future state we have a lot more to do in terms of digitizing processes specifically in credit. The only products we have on online are overdrafts and credit cards. In the next year or two we want all our products on digital channels and that will talks to specifically digitizing certain processes. It may not be automated currently in terms of the decisioning but at least it will be automated from the customer applying for it.
IQ8	What further do you believe needs to be done for us to speed up this transformation process?
Ans8	We have done the right thing. We have given ability to certain teams to go out and explore. To understand new technologies and data. We need to start delivering. I think we are quite slow in learning how to use new technologies. Everything goes through serious governance processes. So we need to be given the freedom to explore these technologies like we did with automated decisions back in 2008. If we want to speed it up we have to

	remove some of the red tape that allows people to play with these technologies. The second thing is that we need to be allowed to make more mistakes.
IQ9	Describe the current use of integrated processes in Business Banking the benefit of it?
Ans9	We built systems and processes in components. So now we are at the key stage in which we are trying to integrate them. So the benefits is reliance on data lineage. When we hand off to a human being some of our lineage tends to get distorted. We are still busy with integrated processes. The benefit is no to less handoffs which results in less errors and improved customer experience in terms of speed. It reduces bank losses and helps us recognize losses.
IQ10	Describe the current use of flexible/adaptable processes in Business Banking and the benefit of it ?
ANS10	So we have some flexibility and adaptability but it hasn't been something that we have been good at. Some of our systems are built this way. We use tables and parameters to create that flexibility example scorecards. Example I perform analysis and see that certain industries are suffering due to Covid19 and we want to cut back the amount of credit we give to those industries. We are quite flexible in doing that. We can also throttle certain channels to make decisions such as credit approval via app. We can do this real time. The benefit is that we can manage risk dynamically in times of crisis. We are able to respond to risk situations in terms of credit risks and able to change operationally.
IQ11	Describe the current use of automated decision making processes in Business Banking and the benefit of it ?
Ans11	Automated decisions would cover scorecards and preapprovals, benefits will be less credit managers needed . *Respondent alluded to this in earlier responses.*
IQ12	Tell me about other transformational concepts you see being used?
Ans12	No other concepts. Spoke about reading of financial statements through OCR.

Workforce Impact	
IQ13	Tell me how would you describe the changes to the current working environment as a result of digital transformation?
Ans13	

	A lot of operational jobs have been done away with. The changes have been to the automation in operational type jobs, People who have been processing things on paper, that’s what we have targeted. There will be less lower skilled workers. Previously we would employ people that we train to complete a task. Now we are employing people that apply their minds to improve the way things work. The working environment is entirely different. There are different types on people in the current working environment and not the traditional sense of workers. Trying to keep a balance with people who have different skill sets. Previously it was bank/clerk skills required.
IQ14	Tell me how would you describe the changes to job profiles as a result of digital transformation?
Ans14	Manual jobs are being lost. We are trying to employ more chartered accountants that look at complicated deals and actuaries who build out on the models. Job profile has clearly changed. There was no such thing before as a solution strategist or someone solving problems because it was very operational before.
IQ15	Tell me what do you see as the opportunities for the workforce as a result of digital transformation
Ans15	The opportunities are for highly skilled people. The mindset of a solutionist is required. The opportunities will be for more skilled people. The opportunity to work from home, the opportunity of more freedom to solve problems.
IQ16	Tell me what do you see as the threats to the workforce as a result of digital transformation?
Ans16	Loss of jobs to people performing repetitive tasks . the people that are unable to change to new technology will be under threat. Every time we make changes the threat is to someone performing an operational job and the threat is for those that do not want to change. If you have the ability, skillset and embrace the change then there is huge opportunities. There needs to be a willingness and ability to change you don’t need to be an expert in the topic, you need to know the machine and how it functions. We will need to understand more about technology and less about the topic.
IQ17	How have you seen the workforce adapt/take to digital transformation concepts?

Ans17	The biggest change I saw was when we started using automated decisions. There was push back initially but eventually they accepted it. The workforce accepts the changes without training etc because they know that this is the way it needs to be and they move on. They also believe that the changes are ultimately for their benefit, the customers benefit and the banks benefit. (lower end). Eventually they trust that the decision is right. There is still a lot of changes in the higher end in which when changes are to be made everyone wants to be included in it but that slows things down. Just getting people to agree is hard work.
IQ18	In your opinion describe what further needs to be done to ensure that the workforce is able to perform in an ever changing digital world?
Ans18	We need to train people in the more relevant roles so that they can adjust to what is coming. It doesn't help training people on a system because that system will not be around for a long time. We need to upskill workers on the new technologies and how to use them in their jobs. We have closed a lot of our training departments down. We shouldn't be going against strategy; everything needs to be digitized. Workers need to be trained on what changes mean to their job. If we don't do that then acceptance to the change becomes difficult.

Field Notes for Participant 5

Disruptive Technologies	
IQ1	Tell me how you would describe the current use of disruptive technologies in Business Banking ?
Ans1	• Using technologies for some time to automate functions • We use models to make automated decisions in credit • We use data to calculate risk positions We focus a lot on pushing these services and products via our digital channels
IQ2	How would you describe the importance of embracing disruptive technologies in Business Banking?
Ans2	• Business critical • To remain competitive • To improve cost to income ratio. • We can't employ more and more people all the time. We automate things and use that automated decisions in credit specifically • Sizes of teams have been reduced (can be used as answer to question 11/13/16) • Sizes of teams dealing with technology have increased (can be used as part of answer for question 11/13/15)
IQ3	What do you see as the key disruptive technologies in Business Banking and how are they currently used?
Ans3	• The current ones are scorecard models and automated decisioning. • We are starting to try to read financial statements with OCR • From an IT point of view cloud computing is important for automated testing • The key disruptive technologies are big data and the outcome from that
IQ4	Describe how other current technologies and technological concepts have an influence in changing the way this business operates?
Ans4	• We haven't paid enough attention to the predictive analytics component. In other words what the customer wants and what he needs. We have being doing the push to the customer

Front line and Back office impact

IQ5	Describe how we add value for the customer by using these disruptive technologies in terms of the solutions/products/ services produced?
Ans5	• Help customers manage their business better. • How we add value to their life is to provide preapprovals via channel. Through our models we predict that the customer needs an overdraft and we position it to him. The value that the customer is getting is that his time is important. • Saving time for customers is critical.
IQ6	Describe how we add value to our processes by using these disruptive technologies
Ans6	• The value add on a process is that it is automated. • Less room for error. • From an audit perspective we have standardized our processes. So it is also adding value through standardization.

Digital transformation	
IQ7	Tell me about the digital transformation strategy within Business Banking in its current and future state in terms of digitizing processes and operations?
Ans7	• Infancy with transformation. • Strategy has been to automate routine jobs. • Future state need to do a lot more in terms of exposing complex products and functions via digital channels.
IQ8	What further do you believe needs to be done for us to speed up this transformation process?
Ans8	• Given ability for certain teams to explore solutions. • We are slow in learning how to use these technologies. • Governance processes restrict usage.
IQ9	Describe the current use of integrated processes in Business Banking the benefit of it ?
Ans9	• Currently at the stage with integrating processes and systems. • Benefits are created in terms of data lineage. • Less handover points so less errors.
IQ10	Describe the current use of flexible/adaptable processes in Business Banking and the benefit of it ?
ANS10	

	• So we have some flexibility and adaptability but it hasn't been something that we have been good at. Some of our systems are built this way. We use tables and parameters to create that flexibility example scorecards. • We are able to adapt to crisis real time • Able to respond to risk situations
IQ11	Describe the current use of automated decision making processes in Business Banking and the benefit of it ?
Ans11	• Automated decisions would cover scorecards and preapprovals, benefits will be less credit managers needed . *Respondent alluded to this in earlier responses:* The value add on a process is that it is automated. We have a look at the audits in the fulfilment team where we have a lot of manual intervention pushing applications through or generating documents. So once your system is in and your model is in and working the way it needs to and is predictive, then the process is automated and the room for error is less. So the value add on a process is all about accuracy , time and automation. Once it is working you improve the process and the room for errors is less. From an audit perspective we have standardized our processes. So it is also adding value through standardization and we don't have human beings making assumptions about what they should be doing. When we started scoring in 2007 we were getting the events going thereafter in 2008 , 2009. Then we had a worldwide credit fallout. The decision was made not to push those automated decisions and that set us back big time. To give you an idea what we have achieved just on automated decisioning . we had 430 credit managers in 2007, last year we had 209. We reduced the headcount from 430 to 209. The portfolio is now 5 times the size that it was. If we haven't made use of these automated decisions we would have needed to employ 430 credit managers times 5. Based on all these automated decisions like triggers and preapprovals we now only have 209 credit managers. The intention is to further downscale as we learn from the data we have
IQ12	Tell me about other transformational concepts you see being used?
Ans12	• No other concepts. Spoke about reading of financial statements through OCR.

Workforce Impact	
IQ13	Tell me how would you describe the changes to the current working environment as a result of digital transformation?
Ans13	• Loss of operational jobs

	• Less lower skilled workers • Different skills required
IQ14	Tell me how would you describe the changes to job profiles as a result of digital transformation?
Ans14	• Loss of manual jobs • Increate in solution roles
IQ15	Tell me what do you see as the opportunities for the workforce as a result of digital transformation
Ans15	• Freedom to solve problems • Opportunities for high skilled workforce
IQ16	Tell me what do you see as the threats to the workforce as a result of digital transformation?
Ans16	• Loss of jobs with repetitive tasks
IQ17	How have you seen the workforce adapt/take to digital transformation concepts?
Ans17	• Initial push back but overall accepting
IQ18	In your opinion describe what further needs to be done to ensure that the workforce is able to perform in an ever changing digital world?
Ans18	• Need to train employees in relevant roles • Need to upskill workforce

Participant 6

Interview questions for Research Project for degree of Masters of Science in Engineering (50/50)

Title: THE IMPACT OF INDUSTRY 4.0 ON THE WORKFORCE WITHIN A BUSINESS BANKING: PROJECTS AND OPERATIONS ENVIRONMENT

Student Name: JARED SUBRAMANIEN

(Student number: 576849)

School of Mechanical, Industrial and Aeronautical Engineering, University of the Witwatersrand

Demographics and Additional Information

Participant No:	6
Job Role	CIO
Experience in current role	9 years
Experience in Business segment	9 years
Job Area	IT
Experience with technology related projects	11 years

Background to Interview

1. Introduction to Industry 4.0
2. Purpose of research

Interview Questions

Disruptive Technologies	
IQ1	Tell me how would you describe the current use of disruptive technologies in Business Banking
Ans1	From a banking perspective and organizational perspective, we have been very focused on digital transformation. Business Banking has lagged the Retail area somewhat but there has been a strong focus over the last 5 years. We are seeing increasing emphasis on exposing digital channels directly to customers. The challenge in the business banking space is that it is a

	relationship business and not all functions and features have led themselves to automation. AI and machine learning lend themselves to exposing more complex functions to the digital channels. In terms of the use of them , we have always been users of customer data, and behavioural scoring and doing a lot of expert analysis and financial analysis that previously relied on industry experts or financial experts. The big opportunity is automating some of those complex functions. Automation allows us to perform tasks that were previously very expert and analytical and required people with a lot of experience and skill to make credit decisions. There is greater consistency if we are using I and machine learning. The business opportunity around that is more efficiency, more consistency and better outcomes for the business from a credit risk management point of view and better outcomes from a speed point of view. The current use of the technology is leaning towards leveraging our data assets. The bank has been on this digitization journey for quite some time. It has been a strategic focus since we established online banking and we are digitizing the back office more and more. The key is more about automated the very highly qualified decision makers rather than the front-line staff.
IQ2	How would you describe the importance of embracing disruptive technologies in Business Banking
Ans2	It is critical that we embrace it and at the same time it is critical to know how we are going to use these technologies and what the endgame is. The danger with technology is the hype cycle. With some of the AI, robotics and machine learning aspects we are in the trough of the usage. Often with the technologies they over promise initially and people attach all their hopes and dreams to these technologies being the solution to their problem but you will settle down into a more realistic application of these technologies. Going through the hype cycle is important to understand that it is there and that you are practically applying these technologies. You have to embrace the reality but stick with the winners as well. Example the robotics platform struggled to go through the system workflow. You have to be strategic and smart about which technologies you back and sometimes the return on investment is not immediate.
IQ3	What do you see as the key disruptive technologies in Business Banking and how are they currently used?
Ans3	The key one would be machine learning (AI) with the credit models that learn from the other inputs. Completing that machine learning cycle is important in our credit assessment algorithms . By applying machine learning the process becomes smarter and smarter every time. We are in the business of lending money to people who can pay us back and we need to manage the risks of this decision.

	Big data exists with sentiment analysis and expanding the way we analyse industries, but it is really for me the machine learning piece that is key. There is a lot of use of more structured data on our side in terms of credit history, financial spreading etc. From an IT point of view cloud computing is important. From a testing point of view, we use automated testing. The problem with the testing is that the system user interface is slow. To automate thousands of tests can take a long time and one of the ways you can do that is scaling up cloud testing environments so that you could execute 10000 test cases in an hour for example. Leveraging that to get more elasticity around our infrastructure is quite a key technology to optimise the costs of managing infrastructure. There are some advantages, but it is around flexibility and elasticity. Any automation technologies are important. We have quite a bit of testing automation, we are looking to automate deployment. The biggest use of AI I use currently is Dynatrace which is used to analyse system performance which provides a lot of value. It detects problems which makes IT operations more efficient given the amount of staff. The IoT concept in our industry is not really something applied in our space. If you think fro a customer point of view for example a farmer measuring things like humidity or acidity of soil there is huge advantages for that. But in terms of our applications I don't see the IoT playing a significant role anytime soon.
IQ4	Describe how other current technologies and technological concepts have an influence in changing the way this business operates?
Ans4	The other technologies are electronic contracts and chain of custody applications, so blockchain potentially can maybe help with digital contracts. We need to have secure ways of managing contracts. It is something we have discussed but it needs to adhere to specific standards. As a bank we are highly regulated and when we adopt these technologies, we need to ensure that we comply to regulations. For example, deeds managed via blockchain.

Front line and Back office impact	
IQ5	Describe how we add value for the customer by using these disruptive technologies in terms of the solutions/products/ services produced?
Ans5	The opportunity for us is that we utilize our data engines, our experience and broader view to help our customers. We can share opportunities and connect buyers and sellers for instance. We understand the customer is in this market and we understand the customer need and we have this ability through the concept of our business directory. We have the AI, machine learning and big data to add value to our customers by exploiting the data sources to their benefit. For our particular use we will be able to make better credit decisions for the customer. This is through the algorithms continuously updating

	rather than an individual managing it. The problem with all this automation is that a lot of customers complain that the decision is not being made by a person anymore. Business banking being a relationship business, so how do you maintain a relationship when there is a machine that is making these decisions. In terms of customer value sharing what we know with the customer and helping him make better decisions and for him to automate a lot of what he may be doing. A good example is that we partnered with a logistics company so that that for our customers we can connect them to suppliers of goods in China. Its about creating these platforms or partnering with platforms an then providing the benefit to customers. The benefit is that instead of the customer doing this themselves they now have a trusted platform to perform all their logistics. Giving customers the access to this information adds value. In business banking in particular that is where the client will feel the benefit. The key for us is not only about helping clients manage money better. All banks do that. So we have got to do more than that. If you look at something like employee benefits, helping the customer manage their payroll, we drove this through CIPC. We should help the customer run his bank. It's about making their business more efficient and automating tasks for them.
IQ6	Describe how we add value to our processes by using these disruptive technologies
Ans6	The headline message that we try to get across is that for our staff we want to automate the redundant tasks so that they can focus on the higher value tasks. However you have to recognize that as we automate more and more complex tasks, puts peoples jobs or livelihood at risk. The concept of applying technology through any revolution is automating manual tasks and with that comes the threat of replacing people. There is an unknown impact on the workforce. At what point will we not need credit managers for for example. When you speak to people about automation they become very insecure of their roles. The value is in creating better workflows so that people can focus more on the relationship side of the business and complex tasks that they need to do. As we implement this is helps advise things like turnaround times which can help us improve our processes but it can also highlight inefficient people. There is a big people component and digitization component. The intent is to make their jobs easier and better by automating and securing things. Ultimately we should be able to boost productivity and the enjoyment of their job.

Digital transformation	
IQ7	Tell me about the digital transformation strategy within Business Banking in its current and future state in terms of digitizing processes and operations?
Ans7	I'd say we're coming to the end of Phase one. We've taken this complex credit workflow process all the way to marking the limit, which is kind of the end of phase one. So that's where we are within commercial lending. The next phase for us is to expose more and more on I, I guess self-help and

	exposing complex credit directly to our customers via the digital channels so more automation from a from a customer point of view. We are kind of on the 80/20 principle currently. Because of the things like Overdrafts, but by value we only automate around 20% of the value of our loans. So we want to change so that we automate 80% of our loans. So improving our scoring I guess, models and scoring engines to be able to make credit decisions on increasingly complex deals and customers. So that will reduce the sort of judgmental credit portion of our business and for me that would be an important phase too . things like ongoing risk management will also be improved through managing the data.
IQ8	What further do you believe needs to be done for us to speed up this transformation process?
Ans8	I think there's a lot of these human elements. So the change management side of things is an ongoing process. We struggle with things you know like regulation and complexity. So I think to fully optimize the customer experience and business process is we need to understand how we simplify the way we work. We work in a complex environment. We are constrained by regulation and legal commitments. We need to reinvent the human aspects of our business. We seem to be applying technology to existing processes. New systems and process also need to be optimized.
IQ9	Describe the current use of integrated processes in Business Banking the benefit of it ?
Ans9	FACT is a good example of integrated processes and systems. Where you got this consistent workflow that is the credit workflow. Previously there were a lot of handovers and you couldn't understand things like turn around times .So understanding the actual flow of work through credit is important. Once you digitize then you can understand that flow of work to understand where there are some of these inefficiencies and blockers it. You got machine learning and AI on the way you do business as well. Taking all the data from these processes, once they are digitized, and it's a lot easier to get this data and analyze it. So we already do a lot of that stuff. Also with dynatrace that APM software. So we record every click so we understand what guys are doing and where these potential issues we feed that data to another at the back end and she marries that to some of the data that she's getting from fact where we trace things like turn around times and blockers etc. I guess it's relatively early days, but we were way ahead of some other areas because now we've got things like turn around times from the system.

IQ10	Describe the current use of flexible/adaptable processes in Business Banking and the benefit of it ?
ANS10	I think this is an area that we need to improve. FACT is a 7 step workflow. So the truth is our processes are not that flexible and adaptable. I think it is a challenge. The challenge is to understand the data to change these processes. But the truth is to change these processes is a challenge from a regulatory point of view or because that's how our business processes and operations are. Because of the nature of our business in don't think there is a lot of flexibility . We are becoming more and more data driven. And applying that to our work processes. We identify where we spend our tie and are looking to be more data driven. I see a bit of adaptability in this in that we are using data to influent decisions. So I see in 18 months time we will be working differently to the way we work now.
IQ11	Describe the current use of automated decision making processes in Business Banking and the benefit of it ?
Ans11	*Respondent alluded to this answer in previous questions answered*
IQ12	Tell me about other transformational concepts you see being used?
Ans12	*Respondent alluded to this answer in previous questions answered*

Workforce Impact	
IQ13	Tell me how would you describe the changes to the current working environment as a result of digital transformation?
Ans13	I think there is an increased emphasis on the learning culture. Increasing universal understanding of data and data flows. There is increased understanding on the analytics side of things. Workers need to think about how do I automate my tasks, or how to I better analyze data to change the way I work, what new skills do I need. Workforce will need to learn new skills faster and will need to go through several versions of your job in which the sills you had before are no longer useful. The workforce needs to be adaptable and flexible by learning more and more.
IQ14	Tell me how would you describe the changes to job profiles as a result of digital transformation?
Ans14	We are not just automating low skilled jobs but also automating highly skilled jobs. So if you are an accountant for instance and you have software doing everything for you then what is the value you add? You would expect people to have much more digital literacy no matter what your job is. If you're a developer its not going to be enough to just be able to code. If you're a system administrator you're going to have to automate and

	understand your job and your efficiencies. The people that will be successful are those that adapt the quickest
IQ15	Tell me what do you see as the opportunities for the workforce as a result of digital transformation
Ans15	Less mundane jobs. There is a lot of manual and admin intensive jobs in our space. There are decisions that rely on the low value work. And a lot of that low value work gets automated and made easier so that you can manage the things that machines don't handle well. People that embrace the digital opportunity and apply the knowledge in a practical way- there will be opportunities for those people. The threat is for those who cannot adapt.
IQ16	Tell me what do you see as the threats to the workforce as a result of digital transformation?
Ans16	*Respondent alluded to this answer in previous question*
IQ17	How have you seen the workforce adapt/take to digital transformation concepts?
Ans17	There is more understanding of data and analytics. People are more aware of the value of data and the responsibility of data. There is a universal data awareness at all levels. People have realized the importance of data
IQ18	In your opinion describe what further needs to be done to ensure that the workforce is able to perform in an ever changing digital world?
Ans18	Its about embracing that things are going to change. We need to help the workforce what are the training mechanisms. We also need to understand how we manage their fears. Building a more adaptive learning culture that embraces the reality.

Field Notes for Participant 6

Disruptive Technologies	
IQ1	Tell me how you would describe the current use of disruptive technologies in Business Banking?
Ans1	• Very focused on it with increasing emphasis on exposure to digital channels • The challenge in business banking is that it is a relationship business and not all functions are automated • The business opportunity around that is more efficiency, more consistency and better outcomes for the business • The current use of the technology is leaning towards leveraging our data assets • The key is more about automated the very highly qualified decision makers rather than the front-line staff (can be used as part of answer to question 11/13/14)
IQ2	How would you describe the importance of embracing disruptive technologies in Business Banking?
Ans2	• Critical to embrace it • Need to go through the hype cycle but also stick with the winners • Need to be smart to realize return on investment
IQ3	What do you see as the key disruptive technologies in Business Banking and how are they currently used?
Ans3	• The key is machine learning (AI) within the credit models that continuously learn from inputs. • Process becomes smarter and helps manage risks • Big data exists with sentiment analysis • From an IT point of view cloud computing is important for automated testing • Automation is important with testing automation to automate deployment • IoT not really applied and don't see it playing a significant role anytime soon
IQ4	Describe how other current technologies and technological concepts have an influence in changing the way this business operates?
Ans4	• Blockchain to potentially help with digital contracts however regulation is restricting use

Front line and Back office impact	
IQ5	Describe how we add value for the customer by using these disruptive technologies in terms of the solutions/products/ services produced?
Ans5	• Use data to help customers • Connect buyers and sellers • Make better credit decisions for the customer • Relationship business so many customers also do not trust automated decisions. • Giving customers access to info adds value
IQ6	Describe how we add value to our processes by using these disruptive technologies
Ans6	• Want to automate redundant tasks so that staff can focus on higher • The value is in creating better workflows so that resources can focus on higher value tasks. • There is a big people component and digitization component. The intent is to make their jobs easier and better by automating and securing things

Digital transformation	
IQ7	Tell me about the digital transformation strategy within Business Banking in its current and future state in terms of digitizing processes and operations?
Ans7	• I'd say we're coming to the end of Phase one. We've taken this complex credit workflow process all the way to marking the limit, which is kind of the end of phase one • Next step is to expose more automated functions to customers • We only automate around 20% of the value of our loans currently • Automating more will reduce the judgemental credit portion and improve ongoing risk management.
IQ8	What further do you believe needs to be done for us to speed up this transformation process?
Ans8	• Change management is a struggle • Legislation and regulation also impact implementation. • We need to simply complex business processes and the way we work
IQ9	Describe the current use of integrated processes in Business Banking the benefit of it ?
Ans9	• Previously there was a lot of handover points and were not able to track things like turnaround times.

	• So understanding the actual flow of work through credit is important. Once you digitize then you can understand that flow of work to understand where there are some of these inefficiencies and blockers it. • Integration allows for access to data to track and improve.
IQ10	Describe the current use of flexible/adaptable processes in Business Banking and the benefit of it ?
ANS10	• It is an area that needs improvement. • Regulations and business process impact flexibility and adaptability. • We are adaptable in the sense that we are now using data to influence decisions.
IQ11	Describe the current use of automated decision making processes in Business Banking and the benefit of it ?
Ans11	*Respondent alluded to this answer in previous questions answered* We are kind of on the 80/20 principle currently. Because of the things like Overdrafts, but by value we only automate around 20% of the value of our loans. So we want to change so that we automate 80% of our loans. So improving our scoring I guess ,models and scoring engines to be able to make credit decisions on increasingly complex deals and customers. So that will reduce the sort of judgmental credit portion of our business and for me that would be an important phase too . things like ongoing risk management will also be improved through managing the data. The problem with all this automation is that a lot of customers complain that the decision is not being made by a person anymore. Business banking being a relationship business, so how do you maintain a relationship when there is a machine that is making these decisions
IQ12	Tell me about other transformational concepts you see being used?
Ans12	• No new concepts

Workforce Impact	
IQ13	Tell me how would you describe the changes to the current working environment as a result of digital transformation?
Ans13	• Learning culture developed • Increased digital literacy
IQ14	Tell me how would you describe the changes to job profiles as a result of digital transformation?
Ans14	• Automating low and high skilled jobs • Workforce needs to learn new skills faster

IQ15	Tell me what do you see as the opportunities for the workforce as a result of digital transformation
Ans15	• Less mundane jobs • Knowledge opportunities
IQ16	Tell me what do you see as the threats to the workforce as a result of digital transformation?
Ans16	• Loss of jobs
IQ17	How have you seen the workforce adapt/take to digital transformation concepts?
Ans17	• Workers are more aware of data
IQ18	In your opinion describe what further needs to be done to ensure that the workforce is able to perform in an ever changing digital world?
Ans18	• Provide training • Build an adaptive learning culture

Participant 7

Interview questions for Research Project for degree of Masters of Science in Engineering (50/50)

Title: THE IMPACT OF INDUSTRY 4.0 ON THE WORKFORCE WITHIN A BUSINESS BANKING: PROJECTS AND OPERATIONS ENVIRONMENT

Student Name: JARED SUBRAMANIEN

(Student number: 576849)

School of Mechanical, Industrial and Aeronautical Engineering, University of the Witwatersrand

Demographics and Additional Information

Participant No:	7
Job Role	COO
Experience in current role	5 years
Experience in Business segment	8 years
Job Area	Projects
Experience with technology related projects	16 years

Background to Interview

1. Introduction to Industry 4.0
2. Purpose of research

Interview Questions

Disruptive Technologies	
IQ1	Tell me how would you describe the current use of disruptive technologies in Business Banking
Ans1	OK, so I'm going to specifically start with Lending, but then I'll speak to in general for the bank as a whole. We first walked into a sort of automation and then from that we started our transformation journey, but automation first focused on standardization and then optimization. From that sort of

	perspective, then we can easily with using that architecture, you're obviously starting to structure databases, and that's most probably the best reason. The main reason why we went onto this automation journey is to prepare for what is happening in the future. We are focused on event driven architecture. But also that's where your AI stuff comes into play. The bottom line is you need to have good, structured or good quality data in order to get into disruptive technologies. So the bottom line of AI is if you do not have that it will not will not succeed. So all of these artificial intelligence, natural language processing, OCR machine learning, all of those things do depend on that. I think that's the key thing that I would want to get across and obviously the main reason of why we are doing this is because we want to be more efficient. We want to adjust the income ratio given that we're moving into a digital world. Why are you doing this is you want to be efficient because you want to have improved customer experience and you want and you want to also get rid of the non value adding activities for workforce because it's at the end of the day increased capacity, which aids financial resources. We have been on this journey for 5 years focusing on transformation through automation. We have been looking at natural language processing in call centres. It is more machine learning from the way that words are written. In the SA context it will play a major role because you have to have a huge database.
IQ2	How would you describe the importance of embracing disruptive technologies in Business Banking
Ans2	It's not a choice anymore to necessity. You will not be a company in the future if we do not invest in this now and in some cases some people are already too late. For example the newspaper industry. They were warned that they should change their model due to the digital revolution. So for banking if we do not do this type of investment then you will not exist in the future. You might have limited services or nothing at all.
IQ3	What do you see as the key disruptive technologies in Business Banking and how are they currently used?
Ans3	AI is defined as machine learning and OCR. So for me automation, AI, big data analytics is what we are exploring. Internet of Things for me is where we eventually will end up. Cloud computing is a cheaper way, but there's a huge lag on that, and a lot of things that were going to make the use of it difficult. I thought of the South African context of POPI. And I actually don't know how you have international companies getting past that. Im not too comfortable on the progress and maturity of cloud computing. And to be honest, cloud computing is just the internal efficiency that you can have. But if you have all these other things the client experience is improved. So for me, if I focus on those three things first I will already achieve what I need to. You know, the Internet of Things is where it's eventually going to end up, but we're not getting that space because of Wi-Fi. The connectivity is just not good enough in our country. I do think it’s a nice technology to play with in the upper end of the market.

	Big data analytics is critical. We look at transactional information, we look at social media information. With these technologies the workforce is very much threatened in the lower end. These technologies take away the admin burden. In the banking world we do employ lower skilled workforce for these admin functions. Most of their jobs will be taken away with these types of technologies. The key thing is that with using these technologies we need to repurpose the workforce. Some people were business analysts/ project managers and they now have become data owners and data quality managers. If we do not get people to embrace new thinking and not be administrative type of people then the workforce will fall behind. The people that are story tellers will remain in the future because what these technologies don't do well is to tell the story. These technologies do a specific task. We are going into a world where there is more behavioral thinking an people need to have more soft skills. It is about a mindset change.
IQ4	Describe how other current technologies and technological concepts have an influence in changing the way this business operates?
Ans4	Social media is becoming more influential. Remote working is a big thing with interoperability of video conferences. They need to converge so that they become the new emerging technology.

Front line and Back office impact	
IQ5	Describe how we add value for the customer by using these disruptive technologies in terms of the solutions/products/ services produced?
Ans5	We will have more contextual offers. From the data we get from them we are able to offer them what we think they need. More proactively instead of reactively. We will have more conversations with the customer on how to expand their business. More like a partner than anything else if you take away the admin burden with these technologies.
IQ6	Describe how we add value to our processes by using these disruptive technologies
Ans6	From a back office perspective its efficiency for the customer in terms of turnaround times. It will become more of a quality oversight rather than a function. Quality oversight from a human being interaction and controlling the technology.

Digital transformation	
IQ7	Tell me about the digital transformation strategy within Business Banking in its current and future state in terms of digitizing processes and operations?
Ans7	

	We are well advanced in terms of what we want. Many other banks are focused on front line automation using bots etc but not on the credit transformation. We are currently ahead of other banks with transformation but my only concern is if we don't speed up delivery. This is hampered by certain maturity of processes, platforms etc. We were first a service driven architecture and not we are a data driven architecture. CREM will decide what decision needs to happen be it by a machine or a front line worker. We are now trying to prove this concept. If we get it right then we cut about 35% of activity in the lending space.
IQ8	What further do you believe needs to be done for us to speed up this transformation process?
Ans8	IT needs to deliver faster. Governance is restricting us. Our data platform and architecture is low in maturity and needs investment. We are restricted by resourcing on our platform and it requires investment. We also need the right skills. Still have very old school thinkers. We need a mixture of skills within the workforce.
IQ9	Describe the current use of integrated processes in Business Banking the benefit of it ?
Ans9	Automation is integrated processes. I believe in modularity of system architecture. It needs to do a certain thing well. Integrating across these systems is the outcome. The benefits is efficiencies through straight through processing. This creates consistency in the service. People fail when there is manual intervention , people fail when there is no process. And when we fail it is a huge risk or a huge audit finding or a huge financial loss. When we have integrated processes these things are eliminated.
IQ10	Describe the current use of flexible/adaptable processes in Business Banking and the benefit of it ?
ANS10	Not so much flexible and adaptable processes. For a large organization like ours we don't want to customize anymore but we want to configure. We want to standardize to makes things efficient and quick. Unfortunately we are not quite there yet. Currently the way we are architecturally set up it does take a bit longer. We are building towards modularity. At this stage we have a mixed model between system and people. The reason is because we are still tied down by legacy systems. We have one leg in legacy systems and one leg in the newer systems. We have the foundations built.
IQ11	Describe the current use of automated decision making processes in Business Banking and the benefit of it ?
Ans11	We use it in scoring. And we have 3 minute turnaround times on some of our deals. It adds to consistency of decision and turnaround times. We do not also need people in those positions to make decisions anymore. We do also have early warning triggers in our processes. Also have auto renewals- no decision required from a person.

	Don’t need a credit manager or sales person in some cases because the customer gets the approval and just signs documentation. There is full STP in some of our processes. Cost to income is improved, efficiency for customer is improved. It also impacts relationship mangers for example, in the future they need to be problem solvers. They need to use data and understand data to help the customer.
IQ12	Tell me about other transformational concepts you see being used?
Ans12	None

Workforce Impact	
IQ13	Tell me how would you describe the changes to the current working environment as a result of digital transformation?
Ans13	The working environment is stressed because we have one leg in legacy systems and one leg in the new and people are confused because we haven’t fully rolled out the new part. Right now we are lagging on our plans versus our implementation and that’s due to constraints and capacity because the investment curve is lifelong. Business people don’t get that lifelong journey. Workforce is also tired because of all the change because of this transforming period that we are in. If the manual component goes down then it would not be too much of a problem . Now we are expecting them to do too many things. Right now we have a workforce that is rejecting change.
IQ14	Tell me how would you describe the changes to job profiles as a result of digital transformation?
Ans14	I do see changes in the higher skilled workforce as well. I think that layers of managers will disappear . There is less manual input for them to manage. There will be less managers at the top and more leaders and more innovators. There will be a lot less middle management component. I think our financial and capacity resourcing is wasted there. The middle layer creates confusion. So when you implement you implement from the visionary to the bottom. I think we are not doing enough for the lower skilled workforce, we need to give them the skills. Data translators will be massive skillset internationally. they do business process ,systems and data and put them together and derive some value out of it. Analysts may become data translators
IQ15	Tell me what do you see as the opportunities for the workforce as a result of digital transformation
Ans15	Data engineers and data scientists. Taking data into a context of enablement. People that create APIs and systems benefit from data.

IQ16	Tell me what do you see as the threats to the workforce as a result of digital transformation?
Ans16	The biggest threat is inability to change with time. It’s a way of thinking and a constant need for learning.
IQ17	How have you seen the workforce adapt/take to digital transformation concepts?
Ans17	There is a trade-off because as the business grows people start getting frustrated because a lot of people are required to do multiple tasks at the same time. Its either the person does not have the ability to be adaptable or the environment itself is making it very hard to adapt. In general I have seen eagerness and understanding of why.
IQ18	In your opinion describe what further needs to be done to ensure that the workforce is able to perform in an ever changing digital world?
Ans18	We need to improve speed of execution. We need to have a mind shift of shorter design and solutioning and quicker implementation. We need to speed up internal development to use this new technology

Field Notes for Participant 7

Disruptive Technologies	
IQ1	Tell me how you would describe the current use of disruptive technologies in Business Banking ?
Ans1	• First focused on automation , then standardization then optimization • Data need to be well structured for an event driven architecture using AI • the main reason of why we are doing this is because we want to be more efficient. We want to adjust the income ratio given that we're moving into a digital world. • Create efficiencies for client by removing non value adding activities • Enhance customer experience
IQ2	How would you describe the importance of embracing disruptive technologies in Business Banking?
Ans2	• To remain competitive • To remain relevant • It is a necessity • To keep an industry standard
IQ3	What do you see as the key disruptive technologies in Business Banking and how are they currently used?
Ans3	• Automation , big data then AI are the key concepts we look at. • Cloud computing is used to some extent but still a lot of regulations that is restricting use. • Big data analytics is critical. We look at transactional information, we look at social media information • Last paragraph in the answer talks more to the workforce impact (can use this paragraph as part of the answer to the workforce questions).
IQ4	Describe how other current technologies and technological concepts have an influence in changing the way this business operates?
Ans4	• Social media and remote working technologies. The convergence of them effectively can lead to new ways of work.

Front line and Back office impact	
IQ5	Describe how we add value for the customer by using these disruptive technologies in terms of the solutions/products/ services produced?
Ans5	

	• Use data to create more contextual offers for client. • Perform more advisory functions on business expansion rather than spend time on tasks that can be done automatically.
IQ6	Describe how we add value to our processes by using these disruptive technologies
Ans6	• Efficiency created to quicker turnaround times • Provides quality oversight

Digital transformation	
IQ7	Tell me about the digital transformation strategy within Business Banking in its current and future state in terms of digitizing processes and operations?
Ans7	• High maturity • Slow implementation
IQ8	What further do you believe needs to be done for us to speed up this transformation process?
Ans8	• Skills required • Maturity of data platforms is low and need to invest more
IQ9	Describe the current use of integrated processes in Business Banking the benefit of it ?
Ans9	• Automation results in integration and interoperability. • Decreases errors
IQ10	Describe the current use of flexible/adaptable processes in Business Banking and the benefit of it ?
ANS10	• Not at the level we want to be at
IQ11	Describe the current use of automated decision making processes in Business Banking and the benefit of it ?
Ans11	• Used in scoring • Improves turnaround times in workflows.
IQ12	Tell me about other transformational concepts you see being used?
Ans12	• None

Workforce Impact	
IQ13	Tell me how would you describe the changes to the current working environment as a result of digital transformation?
Ans13	• Stressed working environment due to the requirement of performing multiple tasks and being unaware of strategy

IQ14	Tell me how would you describe the changes to job profiles as a result of digital transformation?
Ans14	• Less middle managers • Data translators needed
IQ15	Tell me what do you see as the opportunities for the workforce as a result of digital transformation
Ans15	• Opportunities for people that work with data
IQ16	Tell me what do you see as the threats to the workforce as a result of digital transformation?
Ans16	• Inability to change yet there is a constant need for learning
IQ17	How have you seen the workforce adapt/take to digital transformation concepts?
Ans17	• Eagerness and understanding why
IQ18	In your opinion describe what further needs to be done to ensure that the workforce is able to perform in an ever changing digital world?
Ans18	• Shorter design and quicker implementation

Participant 8

Interview questions for Research Project for degree of Masters of Science in Engineering (50/50)

Title: THE IMPACT OF INDUSTRY 4.0 ON THE WORKFORCE WITHIN A BUSINESS BANKING: PROJECTS AND OPERATIONS ENVIRONMENT

Student Name: JARED SUBRAMANIEN

(Student number: 576849)

School of Mechanical, Industrial and Aeronautical Engineering, University of the Witwatersrand

Demographics and Additional Information

Participant No:	8
Job Role	IT Operations Head
Experience in current role	3 years
Experience in Business segment	10 years
Job Area	IT
Experience with technology related projects	14 years

Background to Interview

1. Introduction to Industry 4.0
2. Purpose of research

Interview Questions

Disruptive Technologies	
IQ1	Tell me how would you describe the current use of disruptive technologies in Business Banking
Ans1	There's a great opportunity for commercial space to to utilize such technologies in order to at least try to be ahead of our competitors and then be able to provide customers with at greatest service that we can. I'll say, well, we're only in the beginning of implementing those disruptive technologies as a bank, as well as just business banking.

	I wouldn't say we have met, maturely done it properly, and I think we're in a phase of transforming our our architecture, transforming our systems and just transforming our business processes in order for us to be able to at least benefit from these new technologies that are being implemented across the globe.
IQ2	How would you describe the importance of embracing disruptive technologies in Business Banking
Ans2	I do think it's quite critical for our space to implement these technologies. Why I'm saying that? Because our like the smaller banks, they are so aggressive in terms of these changes while simply because they are in a better position to make changes quicker. And when they do that it means they can attract more customers, new customers and often that they can actually steal our customers. So if we don't do that as a bank, if we don't do that as Commercial, then we stand a chance of actually losing the prospect of getting new customers, losing or finding ourselves in a situation where we can possibly lose our existing customers. It is critical in order to remain competitive. So that we we develop new technologies and able to attract new customers because in order for us to grow we need new customers and unfortunately the smaller banks actually taking them. And if we don't aggressively implement these new ways of doing things, we might find ourselves in a difficult situation as a bank.
IQ3	What do you see as the key disruptive technologies in Business Banking and how are they currently used?
Ans3	Cloud computing is a big thing for us. I see a big data analytics also a big thing that you need to implement, but over and above that the AI also can really play a huge role and automation as a whole helps us a lot. Automation helps us in terms of removing manual work and ensure that we don't spend hours and hours doing something that can be done within a couple of seconds. For technical people it benefits business because now we can respond to business queries quicker than before, and when it comes to cloud computing, obviously we save a lot of money right now. As a bank, we pay a lot of money when it comes to storage, a lot of money when it comes to supporting these technologies, but when you use the cloud you pay for only what you are using. You're not paying for something that you're not even using, so we benefit in that way in terms of the amount that we pay. But over and above that they turn around time. It's quicker when we request infrastructure from the cloud, than requesting it internally. So those are the benefits that I'm seeing a within the Department or within the segment.

	And also, there's a huge opportunity when it comes to data analytics. You might have a lot of data sitting in your environment, but if you don't have tools to analyze and understand it so that you can and then come up with predictive systems to start selling products to our customers before they can even come and ask for them, because remember it is very critical to understand the behavior of our customers so that you can send the product to them. So over the years we've been migrating systems and decommission the old systems, migrating them to a data space and making sure that data is centralized in such a way that you can find data for a customer sitting in another Department while you working from another Department. In that way we are able to utilize data, so I will say we are on such a great journey as a Department in terms of at least cleaning up our data because as a first step we have cleaned up our data. Firstly is automation. Secondly, it's a it's data that then it's cloud computing and then AI. Often Internet of Things is there, but I I feel like it's still early days for it to really work the way it is. And remember there have been restrictions when it comes to cloud computing due to regulation, so you're not allowed to have data sitting anywhere. Past five years that they never had data centers in South Africa. Meaning if you utilize their cloud platforms your data will be sitting in UK/US somewhere or in China. But for the past five years, they've been aggressively addressing that problem. As commercial, we're planning to take our backups to the cloud in order to save on storage, so that's what we are driving right now. As a technical team we are doing that there is not much impact from a project perspective, but when it comes to, for example, there's a new project and you want me to set up new a servers for that project, it will be easier when I'm doing it from the cloud . The benefit from the project side will be quicker turnaround times.
IQ4	Describe how other current technologies and technological concepts have an influence in changing the way this business operates?
Ans4	So for example, there are blockchain technologies that are being driven by the fintech companies and they are pushing it in a big way and smaller banks actually adopting that. So if we don't work on as a as a bank or as a Department or segment we might find ourselves in a situation where we find it so hard to compete with the smaller banks, but I think at this stage it is still a conversation within the bank. There hasn't been any strategy with blockchain implemented, but it has a huge impact in our space and as I said influencing the way we do things going forward as a banking industry.

Front line and Back office impact	
IQ5	Describe how we add value for the customer by using these disruptive technologies in terms of the solutions/products/ services produced?

Ans5	the way customers benefit from all these disruptive technologies, for example, these tools actually forces us to have highly integrated systems. Meaning if we have a customer that has a special product and the customer uses maybe for example the banking app then the customer can be able to do everything else from that app. It is highly integrated from a customer side. So that's a benefit from the customer, especially the younger customers. in order to achieve that in order to achieve that seamless integration, we have to do a lot in terms of cleaning up our data, linking our systems, making sure that our core systems talks to each other and make sure all that process. We also have automation that saves time and that talks to integration. So if we don't do that, we would never stand a chance to have a situation where customers are able to just click a button and have a loan approved. And once they've done that, they can approve, apply for a bond on the same app, apply for car finance on the same app. But everything in the same app and we also sell the product from the same app. We advertise a certain product because we feel like their customers deserve or would need that product . It gives the customer the platform in which they can do things online with greater efficiency.
IQ6	Describe how we add value to our processes by using these disruptive technologies
Ans6	The technology has helped us transform our internal business processes. For example, if it took a 15 people to complete the loan origination process some years ago because we have to go to this place and go to that person. But now within a system most of those workflows are automated. So as we implement systems and consolidate systems and integrate systems it transforms our business processes and workflows. Some banks do not like to change their business processes but when it comes to disruptive technologies you are forced to change it and transform processes in a good way. The tools are helping us create more efficiency. We don't waste time, we don't waste data, we don't waste efforts. So when you use these technologies it's a lot of reuse, you know so you don't ask for data 10 times or something like that. You know everything we do and you can just fetch it whenever you want.

Digital transformation	
IQ7	Tell me about the digital transformation strategy within Business Banking in its current and future state in terms of digitizing processes and operations?
Ans7	When it comes to digital transformation I think it's hard to only focus on our segment. I think it's actually this strategy is driven from the group and then as the segment we have to comply and also make sure we transform our systems in a digital way. We are pushing at it. We are in a position where I feel like in in a couple of years to come we will be able to have loan originations done from our banking app. But in order to reach that level we have to at least internally as a segment, we need to ensure that our systems

	are ready for that. So every now and then when there's a new project, they always ask about the strategy to go digital. What are we planning to do about that? It's quite huge and we've got a lot of old system so in that way we have to firstly identify the systems that needs to be decommissioned. Once we identify those on how are we going to replace them or then we check one functionality from one system and put it to another system. I feel like we are not already there but we are going at it aggressively. At a group level we are advanced compared to what is happening in the segment. Especially on the retail side. We are somewhere in the middle in terms of transformation. We really getting somewhere and I like the fact that even when there is a new project we always talk about the option of putting it in the platform because in putting it in the platform that's how we digitalized our systems making sure that they're accessible from different channels.
IQ8	What further do you believe needs to be done for us to speed up this transformation process?
Ans8	*Responded provided the answer to this question with the answer in the previous question*
IQ9	Describe the current use of integrated processes in Business Banking the benefit of it ?
Ans9	The only thing I can further mentioned is that integrating systems helps a lot in terms of even reducing the number of people doing the same thing over and over again. We're not saying people should lose their job. So when you integrate your systems, you make it easy for them to focus on more important things than just running around. Automation is created which saves the time.
IQ10	Describe the current use of flexible/adaptable processes in Business Banking and the benefit of it ?
ANS10	Yeah, I think we are somehow doing it. I think we are very much right now at this stage we are very much flexible. In the past it was really so hard to even have these conversations in terms of the systems, but we have gone so far and I feel like our systems are really flexible and adaptable . I'm saying that our systems are now in a position to integrate with and assist. Previously we were not able to do this. Now when people wants to talk to us in order to fetch our data or when people want to talk to us in order to push them data from our systems, it's so easy to integrate with them. So for me, that's flexibility. For me it means we are able to adapt. We are able to accept or also integrate with other people, because you can't if you develop systems that can only talk to themselves and they not allow someone is coming from another Department to talk to. So fortunately as a segment we have overdeveloped our system in such a way that we've got APIs that allows people to call the system. Yes, I'm 100% certain that we are adaptable and there's still a lot of work to be done, but we are in a position where we can integrate with anyone who wants to talk to us.

	And the benefit of that is that it is easy for us as a segment to develop new products based on our integration with other systems that we couldn't integrate before.
IQ11	Describe the current use of automated decision making processes in Business Banking and the benefit of it ?
Ans11	We use it a lot with for example the likes of scoring systems. With that, the way we are benefiting that is that so automated decisions are trusted way more than when someone has to make a call. Because automatic decisions are based on models that you're implementing, or certain data that you import into your models and based on that data then you make a decision whether you grant loan or not. So I I think the biggest benefit is that we can trust the system. We can trust that whatever decision has been made by the system it is really accurate because it's based on the specific model that was developed for certain reasons, and so if you capture data into a model and then it gives you an output and say yes, you can grant this person a loan. But if you wait for people to use their emotions in order to make decision then we have issues like previous people who have will sit down in a room and decide can we give this person a loan or not. But these days we don't do that. Right now we are highly using it and I'm quite confident that should there be a need to improve the process or be in a better position to do it without any hassles.
IQ12	Tell me about other transformational concepts you see being used?
Ans12	I don't have any more in mind . Because I think I've spoke on data and AI . It gives us a position in which we can predict for example if someone needs a loan. And then you see that on monthly basis he they keep on spending a lot of money somewhere else. And then you just decide to use that data to sell them that specific product that might be useful to them

Workforce Impact	
IQ13	Tell me how would you describe the changes to the current working environment as a result of digital transformation?
Ans13	It has created a lot of opportunities for people to collaborate. With the introduction of automated tools it has benefited us as a bank such as working from home or any campus. It gives people more time to work. People are able to save time and use time productively. Digital tools have allowed for better collaboration , example instant messaging rather than emails.
IQ14	Tell me how would you describe the changes to job profiles as a result of digital transformation?
Ans14	It requires a lot from employees. It comes with challenges in terms of understanding the new technologies and ways of doing things. Some were used to manual paperwork and now we have automated systems. We need to educate the workforce because every time we transform systems people feel

	like they will be jobless. Need to give workers the platform to learn. Previously we had many bank tellers but now we have an automated way of accepting cash. The only way to keep them is to transform them into someone that can explain these products. It is the responsibility of the bank to create jobs. The bank is currently doing well in terms of transforming workers
IQ15	Tell me what do you see as the opportunities for the workforce as a result of digital transformation
Ans15	I think there is opportunities in creating job profiles for example when somebody joined the bank as a java developer can become a data architect or a data analyst as we transform systems and processes. Previously we used to hire manual testers. But now we are hiring automators. They write scripts to do testing so instead of having 5 people testing a system you just have one developer creating all the test cases putting them in a script and then getting the results. The person who was doing the manual testing can now learn how to become an automator. We are creating opportunities for them in that way. We are starting to hire more automators then the manual testers. I don’t see manual testers replaced entirely as they have the knowledge of the system.
IQ16	Tell me what do you see as the threats to the workforce as a result of digital transformation?
Ans16	The biggest threat is loss of jobs. If you refuse to adopt and transform you find yourself in a situation in which you have no work. The threat is to employees not willing to adapt and adopt. It is critical for employees to work hard and for the employer to create training platforms. The bank currently has training licenses to benefit the workforce
IQ17	How have you seen the workforce adapt/take to digital transformation concepts?
Ans17	Most people are not adapting because they feel like you want to replace them. In my area we find that we have to do a lot of manual work and people claim over time. Now they are hesitant to change because they feel that you are taking away their extra income by implementing automated solutions. Over time is not sustainable so it needs to be cut. We need to plan properly and automate the manual processes.
IQ18	In your opinion describe what further needs to be done to ensure that the workforce is able to perform in an ever changing digital world?
Ans18	

	As a group we need to have people that make sure they do research on what is coming on the big initiatives. I love the fact that the bank is already asking us to learn about blockchain. The tools need to be provided to us The employee needs to ensure that they use these platforms and resources such as bursaries to study further. I feel like a lot still needs to be done to ensure that people are aware of this change. Banking is now IT and each and every person needs to be aware of computers. Going forward we are hiring more people that know about computers.

Field Notes for Participant 8

Disruptive Technologies	
IQ1	Tell me how you would describe the current use of disruptive technologies in Business Banking ?
Ans1	• We are at the beginning of implementing these technologies • we're in a phase of transforming our our architecture, transforming our systems and just transforming our business processes in order for us to be able to at least benefit from these new technologies that are being implemented across the globe.
IQ2	How would you describe the importance of embracing disruptive technologies in Business Banking?
Ans2	• To remain competitive (compete with smaller banks) • Lose existing customers and not gain new customers • It is a necessity • To keep an industry standard
IQ3	What do you see as the key disruptive technologies in Business Banking and how are they currently used?
Ans3	• Automation helps us in terms of removing manual work. • We also then look at big data and AI. • Cloud computing is used to a large extent in the IT space. You're not paying for something that you're not even using, so we benefit in that way in terms of the amount that we pay. But over and above that they turn around time • There is huge opportunity with data analytics. Come up with predictive systems to start selling products to our customers • Firstly is automation. Secondly, it's a it's data that then it's cloud computing and then AI. Often Internet of Things is there, but I I feel like it's still early days for it to really work the way it is. • There are still some regulations for cloud computing but have made great strides towards it, it indirectly assists the project space.
IQ4	Describe how other current technologies and technological concepts have an influence in changing the way this business operates?
Ans4	• Blockchain technologies driven by fintech.

Front line and Back office impact	
IQ5	Describe how we add value for the customer by using these disruptive technologies in terms of the solutions/products/ services produced?

Ans5	• Efficiency from the client side because of highly integrated platforms. • We also have automation that saves time and that talks to integration. So if we don't do that, we would never stand a chance to have a situation where customers are able to just click a button and have a loan approved
IQ6	Describe how we add value to our processes by using these disruptive technologies
Ans6	• It has helped us transform our internal business processes in reducing work and creating efficiencies in workflows. • We don't waste time, we don't waste data, we don't waste efforts. So when you use these technologies it's a lot of reuse, you know so you don't ask for data 10 times

Digital transformation	
IQ7	Tell me about the digital transformation strategy within Business Banking in its current and future state in terms of digitizing processes and operations?
Ans7	• In a good space currently with the strategy that is being driven. • Need to decommission old systems
IQ8	What further do you believe needs to be done for us to speed up this transformation process?
Ans8	*Responded provided the answer to this question with the answer in the previous question* But in order to reach that level we have to at least internally as a segment, we need to ensure that our systems are ready for that. So every now and then when there's a new project, they always ask about the strategy to go digital. What are we planning to do about that? It's quite huge and we've got a lot of old system so in that way we have to firstly identify the systems that needs to be decommissioned. Once we identify those on how are we going to replace them or then we check one functionality from one system and put it to another system. I feel like we are not already there but we are going at it aggressively. At a group level we are advanced compared to what is happening in the segment. Especially on the retail side. We are somewhere in the middle in terms of transformation. We really getting somewhere and I like the fact that even when there is a new project we always talk about the option of putting it in the platform because in putting it in the platform that's how we digitalized our systems making sure that they're accessible from different channels.

IQ9	Describe the current use of integrated processes in Business Banking the benefit of it ?
Ans9	• The only thing I can further mentioned is that integrating systems helps a lot in terms of even reducing the number of people doing the same thing over and over again. We're not saying people should lose their job. So when you integrate your systems, you make it easy for them to focus on more important things than just running around. Automation is created which saves the time.
IQ10	Describe the current use of flexible/adaptable processes in Business Banking and the benefit of it ?
ANS10	• We are currently quite flexible. • Our systems are in a position in which they can be easily integrated with • We are able to adapt to situations because of this. • We've got APIs that allows people to call the system • And the benefit of that is that it is easy for us as a segment to develop new products based on our integration with other systems that we couldn't integrate before.
IQ11	Describe the current use of automated decision making processes in Business Banking and the benefit of it ?
Ans11	• Use it from a scoring point of view. • Automated decisions are based on models so it is trusted more than a human being.
IQ12	Tell me about other transformational concepts you see being used?
Ans12	• I don't have any more in mind . Because I think ive spoke on data and AI . It gives us a position in which we can predict for example if someone needs a loan and then you see that on monthly basis he they keep on spending a lot of money somewhere else. And then you just decide to use that data to sell them that specific product that might be useful to them

Workforce Impact	
IQ13	Tell me how would you describe the changes to the current working environment as a result of digital transformation?
Ans13	• Remote working methods • Increased collaboration
IQ14	Tell me how would you describe the changes to job profiles as a result of digital transformation?
Ans14	• Transforming administrative roles

IQ15	Tell me what do you see as the opportunities for the workforce as a result of digital transformation
Ans15	• Opportunities in data based roles • Opportunities in IT for automators
IQ16	Tell me what do you see as the threats to the workforce as a result of digital transformation?
Ans16	• Loss of jobs
IQ17	How have you seen the workforce adapt/take to digital transformation concepts?
Ans17	• Most people are not adapting because they feel like you want to take away their jobs with changes implemented
IQ18	In your opinion describe what further needs to be done to ensure that the workforce is able to perform in an ever changing digital world?
Ans18	• Employees need to make use of training platforms • Responsibility of employees to learn and upskill themselves

APPENDIX E: THEMATIC CATEGORY 1 ANALYSIS

Coding

Questions	Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9
	1st level coding	**1st level coding**	**1st level coding**	**1st level coding**	**1st level coding**	**1st level coding**	**1st level coding**	**1st level coding**	**2nd level coding**
Questions	**Participant 1**	**Participant 2**	**Participant 3**	**Participant 4**	**Participant 5**	**Participant 6**	**Participant 7**	**Participant 8**	
Tell me how would you describe the current use of disruptive technologies in Business Banking ?	Initial stages with implementing disruptive technology solutions	Digital offerings to client	Immature usage	Focused on automation rather than other technologies	Using technologies for quite some time to automate business processes	Increasing emphasis on exposing digital channels	Focused on automation then standardization	Initial stages of implementation	Implementation Obtaining meaningful data Client efficiency Enhance client offerings Internal automation
	Use data and perform analytics	Customer scored real time	Making use of big data and AI	automate functions for large back office staff	Using data to offer solutions	Big users of data	Use data for event management	Currently transforming architecture to adopt these technologies	
	Solutions available real time	Predictive analysis for solutions		Mature in some areas but non existent with newer disruptive tech	making decisions based on data	use data to automate functions	Technologies depend on well structured data		

		Consolidating systems for overall product offering			Position to the customer on digital channels	automating the functions for highly qualified decision makers	Use it to create efficiencies for the client		
					Decommissioning systems		Enhance customer experience		
Analytics maturity: High= 5, Average= 3, Low=1	3	5	1	5	5	5	5	1	
How would you describe the importance of embracing disruptive technologies in Business Banking	All of our competitors are embracing these technologies	To remain relevant in the market	Challenger banks are ahead	Improve customer experience	Improve cost to income ratio	embrace the reality of industry	To be a company of the future	To keep up with the changes of smaller banks	Competitiveness Cost Effectiveness Customer Experience Internal capability
	Smart technologies assist the customer	To retain customer base	Underpins all our capability as a bank	Competing with local and international companies	Increase competitiveness	related to return on investment	To adapt to industry change	To retain customer base	

	To keep industry standards	younger staff wants to work with newer technologies			to reduce the number of staff employed	Automating higher order functions is key	Adjust income ratio		
	Need to enhance internal processes	Skills retention			Automated decisions is business critical				
What do you see as the key disruptive technologies in Business Banking and how are they currently used?	Big data to gather information on customers	Value chain is fully automated	Machine learning used for predictive analytics	Outside of automation very little implementation of others	Predictive models	Machine learning within credit models that learn from inputs	POPI regulations retrict use of cloud	Removing manual work	Automation useage Big Data useage AI useage Cloud computing useage IoT useage
	Automation for renewals and pre-approvals	Systematic solutions	Cloud computing very new to business banking	Not upgraded old systems	automated decisions of business processes	sentiment analysis of industries	IoT is the end result however we are not there	Storage benefits and cost savings with cloud	
		Big data for proactive recoveries and collection management	No drive for IoT	moving towards data strategies	the data churn is key and how that data is used	Automated tested via cloud	Data is critical to understand customer needs	Analyze data for predictive product offerings	

		Trend Analysis	AI is a subtopic of automation	Cloud computing not used much		any automation technology is important	Automation, AI and big data most critical to meeting goals		
		Understand user pain points systems		IoT not used		IoT not really employed in business banking			
Usage High=5; Average = 3, Low=1 ; None= Zero	Automation =5 ; Big Data = 5; AI=3, Cloud=0; IoT=0	Automation =5 ; Big Data = 5; AI=3; Cloud=0; IoT=0	AI=3; Automation = 5; Big Data=3;Cloud computing = 1; IoT=0	Cloud Computing=1;Automation=5; Big data=3; AI=3;IoT=0	Automation=5; Big Data=5; AI=3; Cloud computing=0;IoT=0	Automation=5; Big data=3; AI=3;IoT=0; Cloud computing =5	Automation =5; Big Data=5; AI=5; Cloud=1;IoT=0	Automation=5, Big data=3;AI=3;Cloud=5;IoT=0	
Describe how other current technologies and technological concepts have an influence in changing the way this business operates?	Biometric sensing for digital channels	Optical recognition to capture information from documents	AI solutions involving optical recognition	In the process of creating contacting platforms	Financial statement reading	Digital contract creation	Remote working technologies	Fintech driven blockchain technologies	OCR capabilities Blockchain capabilities

		Piloting robotic solutions	robotics solutions	New teams to perform rapid builds and prototyping	Model improvement with data churn		Social Media		
		Avoiding manual interventi on	Making processes more efficient		Predictive analytics component				

Category Analysis

Q1
Respondents 2,6 and 7 make reference to maturity of implementation of disruptive technologies in that the unit is well advanced in implementation especially with client facing elements such as digital solutions via online and app channels . Respondents 4 and 5 also agree with this however they believe that the unit is more mature in terms of being on an automation journey rather than implementing newer technologies with respondent 4 stating that outside of automation implementation of other disruptive technologies is limited due to the unit not upgrading underlying systems
Responds 1,3 and 8 have a different take on maturity that is more from an internal perspective rather than client facing. They agree that although disruptive technologies are being applied from a client facing point of view, back end processes are still in the process of being transformed to make use of these technologies which makes usage of disruptive technologies low to moderate.

Respondents 1,2,3,5,6 and 7 state that the unit uses disruptive technologies to obtain meaningful data from the customer in order to improve both customer offerings and internal processes.

Respondents 1,2 and 7 look at the use of disruptive technologies also to provide customer efficiency. This is in terms of providing real time solutions.

Respondents 2,5,6 and 7 state that disruptive technologies are used via client facing elements such as App and Online Banking so that the unit is able to position products effectively.

Respondents 4,5,6 and 7agree that technologies are used to enhance internal processes.

Q2

All respondents state that it is critical to embrace disruptive technologies to remain competitive. Respondent 4 makes reference to not only competing locally but also internationally and with fintech companies. Respondent 8 is weary of the challenge from smaller banks who are adopting technologies aggressively in the current time while larger banks have to upgrade technology to be competitive.

Respondents 5,6,7 agree that the use of disruptive technologies in the unit is also driven by the need to minimize cost and maximize income. In terms of the cost to income ratio it is improved with disruptive technologies due to operational processes being automated which required less staff. Respondent 6 believes that initially there wont be a high return on investment but it is a journey with disruptive technologies rather than an immediate maximizing of income

Respondents 1,2,3,8 believe that it is important to use disruptive technologies to improve customer experience with the solutions provided. They all agree that this gives the ability to retain the existing customer base while also tapping in to new markets and customers.

Respondents 1,2,3,5 and 6 agree that embracing disruptive technologies is as a result of perusing internal business unit benefits. Respondents 1 ,3 and 5 state that disruptive technologies allow for internal process improvement in the form of using automation to assist with key functions and using data to continuously improve processes and decisions. Respondents 2 and 6 talk to internal capability of the workforce being enhanced with Respondent 2 recognizing that if disruptive technologies are not embraced there is potential for the bank to not retain skilled workforce who want to work on new technologies.

Q3

All respondents agree that automation plays a key role in the current business unit. Respondent 8 recognizes automation as critical for being a driver to remove manual work. Respondents 1 to 7 agree that automation in the current environment is used to automate decisions and provide quicker credit evaluation for the customer with auto renewals of facilities. Respondent 2 states the entire value chain within the unit is almost fully automated such that there is little to no interaction by staff from internal processes to client facing elements.

Most of the respondents agree that the use of big data analytics is important withing the current unit. They state that it is critical to understand customer needs and from this data be able to predict what a client needs and offer it to them via online and app capabilities.

The Business Unit also employs AI concepts through machine learning in which predictive models are built to assist the customer from a credit perspective according to Respondents 2,3,5 and 6. AI is however only as a result of having structured data and automation functions as recognized by Respondent 3.

Respondents 3,4 and 7 view cloud computing as a relatively new concept in a projects and operations space. According to Respondent 7 the use of this technology has been restricted for a long time due to regulations surrounding data sharing. Contrary to this Respondents 6 and 8 view cloud commuting as extremely important from an IT perspective and it is currently being used to a great degree to assist with automated testing and storage.

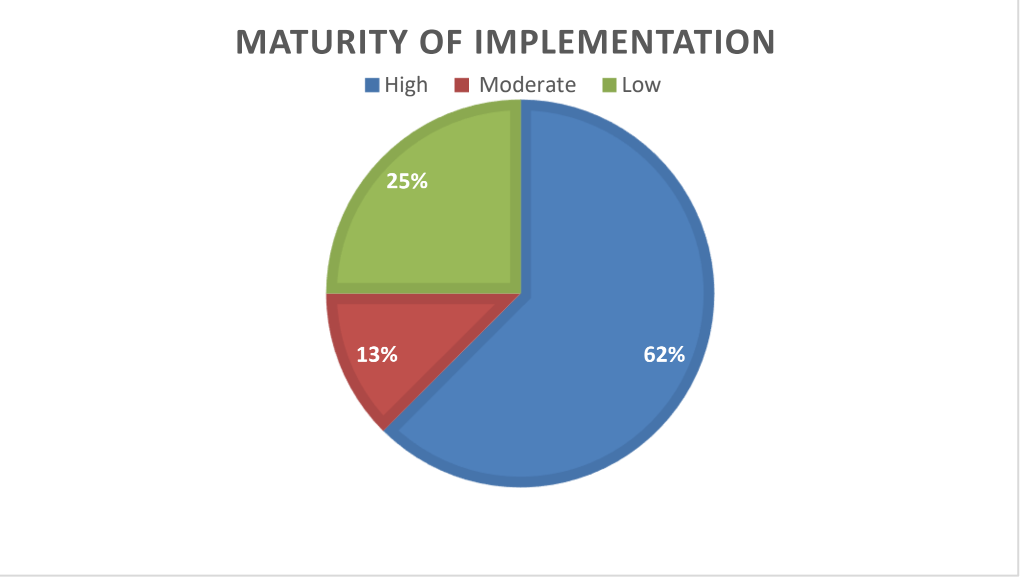
Q4

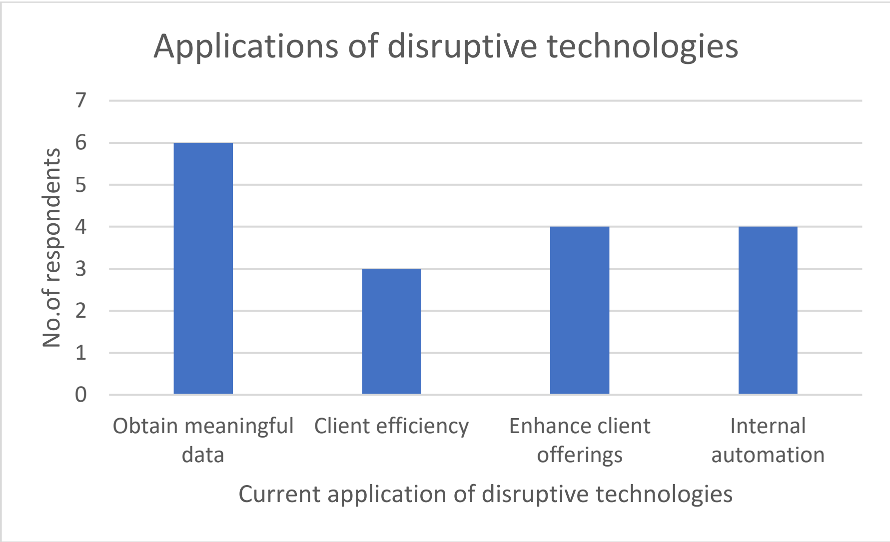
Respondents 2,3 and 4 agree that OCR capabilities built of AI functions will impact business operations in the future through digital reading of financial statements.

Respondents 4,6 and 8 state that it is likely blockchain technologies that will impact business processes and operations in the future.

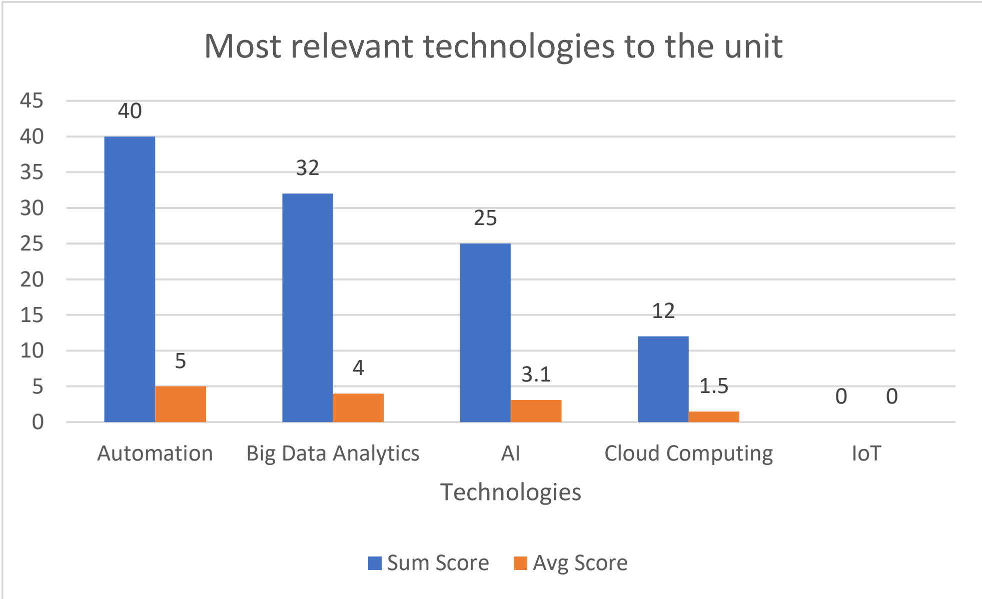
Graphs

Maturity Level	No.of respondents
High	5
Moderate	1
Low	2



How we use DT	No. of respondents	
Obtain meaningful data	6	
Client efficiency	3	
Enhance client offerings	4	
Internal automation	4	

Technology	Sum Score	Avg Score
Big Data Analytics	32	4
AI	25	3.1
Cloud Computing	12	1.5
IoT	0	0



APPENDIX F: THEMATIC CATEGORY 2 ANALYSIS

Coding

Questions	Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9
	1st Level Coding	1st Level Coding	1st Level Coding	1st Level Coding	1st Level Coding	1st Level Coding	1st Level Coding	1st Level Coding	2nd Level Coding
Questions	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6	Participan t 7	Participant 8	
Describe how we add value for the customer by using these disruptive technologies in terms of the solutions/products / services produced?	Customer does not need to come into a branch	Client centric offerings	Both internal and external customers are impacted	Security for the customer	help customers manage their business better	use data to help customers	More contextual offers	Efficiency due to highly integrated platforms	Customer convenience Predictive/custome r centric offerings Turnaround times
	Driving client trends through data	Pre-empting what the client needs	app capability adds value	Derive data from customer	provide pre-approvals via channel	connect buyers and sellers	Use data to offer clients what they need	All offers available on the same platform	
	Proactively offer products	reducing turnaround times for the client	Assisted and self assisted platforms	quicker turnaround times	saving time for the customer adds value	make credit decisions for the customer	Advise on expanding customer's business	Save time due to automation	

	Monitor clients behaviour	convenience for the customer		Smoother customer experience	Predict when the customer needs a product	efficient business and automating tasks			
[redacted]									
Describe how we add value to our processes by using these disruptive technologies?	Real time interfaces allowing for less manual work	reducing time taken to do tasks	reducing time	reduces boredom in employees	automation allows for less error	automation of manual tasks	improved turnaround times	Transform processes by reducing work	Reduce non value adds Create efficiency Error reduction Continuous improvement
		decreasing manual work	efficiency creation	robotics perform straight line tasks	less manual work	Staff focus on higher valued tasks	Quality due to less room for error	Improving workflows	
		data resources allow for continuous process improvement	reducing redundant tasks	Focus staff on higher valued tasks	adding value through standardization	creates better workflows	Quality in control of technology	No wastage of time and data	
			access to data allows for improvement	reduces error and risk within processes	No assumptions made in processes	improve turnaround times		Reuse	
				improves time on tasks	improved accuracy and time	Boost productivity and enjoyment			

Category Analysis

Q5 Respondents 1,2,3, 4 and 8 agree that value is created for the customer by creating customer convenience. Respondents 3 and 8 state that customer convenience is achieved through digital offerings and digital platforms. Having highly integrated processes and systems allow for the ability for all products and services to be available on the same platform according to these respondents. This creates the value add of convenience and a smoother customer experience. Customer centric solutions is a key value add of using disruptive technologies according to respondents 1,2,4,5,6 and 7. Respondents agree that data is obtained from customer behaviour in order to make offerings to the client based on the products that they need. It helps make better decisions for the customer. Respondents 2,4,5,6 and 8 ultimately agree that turnaround times are improved by using concepts of automation to offer solutions quicker to customers.

Q6 Manual work within processes is nonvalue adding with employees wasting time on effort on functions that can be automated. Respondents 1,2,3,5,6 and 8 agree that with disruptive technologies manual work is eliminated. Respondent 1 makes particular reference to real time interfaces and cutting out the middleman between processes and therefor eliminating nonvalue adding tasks. Respondent 8 states that with the use of disruptive technologies there is the concept of reuse of data which allows less wastage of time in fetching data multiple times which ultimately improves turnaround times. Respondents 2,3,4,5,6 and 7 also agree that efficiency is created with the use of disruptive technologies by shortening the time taken to perform tasks. Respondent 2 states that this is down to the process being intuitive by building intelligence into systems that are able to react accordingly. Respondent 5 goes on further to say that the value add in processes is achieved particularly through automation to improve time and accuracy. Respondent 7 states that disruptive technologies in processes adds to the quality output as there is less manual effort and therefore less errors in the process. Respondent 5 also agrees with this by stating that there are less assumptions made in processes. Respondent 4 agrees with the concept by stating there will be less inherit risk in systems and processes. Respondent 2 and 3 note an important aspect due to the availability of data from processes in allowing for continuous improvement. Respondent 2 states that with the data available from processes the unit is able to track user experiences on systems and make improvements due to user frustrations. Respondent 3 also states that digital processes now allow access to more data that was never available before and the data can be used to make process enhancements.

APPENDIX G: THEMATIC CATEGORY 3 ANALYSIS

Coding

Questions	Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9
	1st level Coding	1st Level Coding	1st Level Coding	1st Level Coding	1st Level Coding	1st Level Coding	1st Level Coding	1st Level Coding	2nd Level Coding
Questions	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6	Participant 7	Participant 8	
Tell me about the digital transformation strategy within Business Banking in its current and future state in terms of digitizing processes and operations?	in the middle with transformation strategy	fairly advanced strategy	mature strategy	strategy is set		at the end of transforming processes	Well advanced in strategy	Almost fully transformed	Maturity Front end transformation Back end current transformation Future transformation Constraints
	Customer facing via channels	Focus is on consolidating systems	Building on platform	Slow implementation	At infancy with transformation	Currently automate 20% of value	Currently a data driven architecture	need to decommission old systems	
	Fully automated in collecting and using data	Client offerings are fully digital	Constrained by technology	Not bringing in enough yet for the end customer	Currently automating routine tasks	expose more automated functions to customers	Constrained by maturity of processes	group level is more advanced	

		Staff need to be involved in the digitizing process	complexity because of business model	needs to be alignment between strategy and customer base	Need to digitize more processes	Automation will reduce judgmental credit			
					digitzing processes for full client automation				
Transformation Maturity High=5; Average=3; Low=1	3	5	5	3	1	3	3	3	
What further do you believe needs to be done for us to speed up this transformation process?	Reliant on old technology	Prioritize digitization projects	Upskill workers	Move quicker onto data structures	Slow with learningnew tech	Change management is a struggle	IT needs to deliver faster	Putting new projects on platform	Strategy/process enhancements People aspect System aspect
	Staff uneasy to embrace new tech	New skill set required	Partner with the right organizations	Fresh mindset required	Creating specialist teams	Regulation also impact implementation	Governance restriction	decommissioning legacy systems	
		Diversity of skills needed	Create specialist teams	Embracing fintechs	Need to take more risks	need to simplify business processes	Data architecture maturity is low		
				Outsourcing complex AI	Regulations restrict use		Skills required		

Describe the current use of integrated processes in Business Banking the benefit of it ?	Currently have strong interconnected processes	Allows for a fully automated process	reduces data handover points	Improves standardization	Currently integrating systems and processes	Previously many handover points	Efficiencies in STP	Automation through integration saves time	Process benefits Data benefits Workforce benefits
	Saves time and cost	Allows for system based solutions	Less manual work	Allows for availability of data	Reliance on data lineage	Availability of data	Less risk and error	Less staff doing the same work	
	Creates efficiency	Less manual intervention	Less room for error	Integrated processes allow for building a central data source on which AI solutions and big data solutions can be built	Less handoffs	track inefficiencies and blockers	Less manual work	provides availability of data	
	Integrated processes allow for less handover points of data to accomplish the same task	Can repurpose staff		Highlights inefficiencies	Less errors				
				Improves turnaround times and accuracy					
Usage High=5; Average=3; low=1	5	5	5	5	5	5	5	5	

[redacted]									
Describe the current use of flexible/adaptable processes in Business Banking and the benefit of it ?	Processes built to be agnostic	Assisted and unassisted platforms	Do have the ability to adapt to a crisis	Teams are quick to adapt	Some systems are flexible and adaptable	Need to improve	Not very advanced	Flexible at this stage	Application Benefits Challenges
	Can add on to systems and not rebuild	proactive engangement due to processes and systems	System and process is flexible	Slow on adaptabble system design	able to respond to risk situations	Challenge in understanding data	Tied in to legacy architecture	API's allow to call the system	
	Reuse of systems				automated solutions in place to respond to crisis	Challenge with regulations		Develop new products based on integration	
						Adapting with data involvement			
Usage High=5; Average=3; low=1	5	3	3	3	3	1	1	3	
[redacted]									
Describe the current use of automated decision making processes in Business Banking and the benefit of it ?	midway with automated decisions	credit scorecards	less workers needed	Automation for scoring		Currently automate 20% of loans	Used in scoring		Usage in models Internal efficiencies Staff impact

	Scoring real time	input provided to credit manager decisioning process	more consistent decisions	Automation for financial statement reading	Automated scorecards	Automation used in models and scorecards	Improves turnaround times	Used with scorecards and models	
	Automation in pre-approvals	reject applications due to fraud	Scoring done in lower market	Creates capacity	Automated pre-approvals	Will reduce judgmental credit	Improves consistency of decision	Decisions are more trusted	
	Higher decisions referred to credit manager	Allow for accessing risk		Reduces headcount	Less credit managers needed	Restricted in being a relationship business	Credit manager not required	Less error in judgement from worker	
		Little info capturing needed			Less room for error		Early warning triggers		
					Improved time				
Usage High=5; Average=3; low=1	3	5	3	5	5	3	5	5	
Tell me about other transformational concepts you see being used?	Data and robotics	OCR	Data and robotics	OCR	OCR	None	None	None	None

Category Analysis

Q7

Respondents 2 and 3 agree that the digital transformation strategy of the unit is fairly mature. Both these respondents believe that the unit understands where they want to be with respondent 2 viewing maturity as advanced by stating there is little manual effort involved in processes.

Respondents 1,4,6,7 and 8 also agree that the strategy is mature however current implementation of the strategy is slow which is why they view digital transformation in the unit as moderate. Respondent 6 states that the unit is in the stage of now moving on to digitize more complex functions. Respondents 4,7 and 8 state that transformation is hindered by containing factors from a process and system perspective.

Respondent 5 views transformation at its infancy in the unit by stating that transformation has been done mostly from an operational perspective and believes there is still much to do in terms of transforming the entire value chain.

The unit is well advanced in providing digital solutions to customers via front end channels according to Respondents 1 and 2. Respondent 2 attests to this by stating that from a front end customer element perspective most offerings have been digitized and the unit is now moving on to digitizing the remaining services.

Respondent 4 states that although some products and services are digitized , the unit is still not doing enough for customers with the focus only being on retaining the existing customer base and not catering for new customers.

Respondents 1,2,3,5,6 and 7 look at the usage of digital transformation from a back office point of view. Respondents 1 and 6 agree that the unit is moving towards data strategies with Respondent 7 stating that the unit is well transformed from the previous service architecture to now a data driven architecture. Respondents 2 and 3 talk to a very similar concept of digitization in that the unit is building on platforms and focusing on consolidating systems in order to be more efficient and allow for standardization. Respondents 5 and 6 agree that the unit is using automation to a great degree in digitally transforming routine tasks.

Respondents 4,5 and 6 agree on the future state of transformation for the unit in that more needs to be done in digitizing complex functions which allows for both internal efficiencies and creates value for the client.

Respondents 3 and 8 agree that the usage of old architecture and legacy systems constrain digital transformation.

Digital transformation is also constrained in the unit due to the complexity of the business processes according to Respondents 3 and 7.

Respondent 2 states that staff need to be more involved in transformation and sees the human aspect of the unit as a constraint to digital transformation.

Q8

Respondents 1 and 8 agree that in order to speed up digital transformation the unit needs to decrease its dependence on older systems and architecture. Due to this dependence it is difficult to transform systems according to Respondent 8 thus giving smaller banks an advantage as they don't have legacy systems.

Respondents 2,3,4 and 6 agree that the skills within the workforce on the unit needs to be broadened. Respondent 4 and 2 states that a fresh skillset is required which may entail employing people from outside the bank to have a new approach on digital transformation in order to speed it up. Respondent 3 states that the existing skillset among workers needs to be improved.
Respondents 3 and 5 believe that the unit requires specialist teams to work with digital transformation concepts and find new ways of doing things.
In order to speed up and adapt to transformation in a changing environment Respondents 1,5 and 6 agree that it has been difficult for employees to understand new concepts and technologies as the change management process has been slow.

From a strategy point of you Respondents 1 and 8 agree that there needs to be a shift in prioritizing digitization projects and also getting more projects on the same platform and architecture. Similar to this respondents 4 and 5 state that the unit needs to move on quicker to data architectures.
Respondent 6 is of the opinion that the processes in the unit are too complex which hinders the ability to transform due to complex tasks and business processes need to be made less complex in order to thrive in a technology based environment.
Respondent 4 believes that the unit needs to be more open to embracing fintech solutions and outsourcing skill and resources for complex automation and AI functions in order to speed up transformation. Respondent 3 agrees with this by stating that the unit needs to partner with the right organizations in order to obtain data and perform analysis on it.

Q9
All respondents agree that the unit currently has strong integrated processes and systems which is largely accomplished by the drive to automate tasks.
With interconnected processes and systems Respondents 1,3,5 and 6 agree that it creates less handover points of data. According to Respondent 6 this was previously non existent and there were many handover points of data creating inefficiencies from a process point of view.
Respondent 5 states that with integrated processes there is a reliance on data lineage that gives the ability to track data over time.
Respondents 4,6 and 8 see the key benefit as the availability of data from an interconnected architecture and this was previously data that was not useable.

Respondents 2 and 4 agree on a similar concept of standardization through integrated processes. Integration allows for a fully automated process and standardization.
Due to less handover points Respondents 1,4 ,7 and 8 agree that benefits are realized in turnaround times. Respondents 3,5 and 7 state that there is less risk and error involved in processes and systems.
The availability of data also allows for inefficiencies to be tracked with Respondent 6 stating that blockers in the process can be identified and further inefficiencies optimized. Respondent 4 also agrees with this concept.

Respondents 2 and 7 state that pressure on the workforce is alleviated through integrated processes as there is less manual work needed between processes and systems. Respondent 2 states that this can allow staff to be repurposed to perform higher value functions. Respondent 8 also agrees with this by stating that there will be less staff doing the same thing.

Q10

Respondents 2,3,4,5 and 8 view the application of flexible and adaptable processes and concepts as moderate in the current environment. Respondent 3 states that in recent times the unit has been able to adapt more to industry crisis by having both systems and processes that are flexible. Respondent 4 agrees with this statement from a process point of view however believes the business unit is lacking when it comes to employees and teams being flexible and changing the way they work. Respondent 2 and 5 state that the business unit is flexible in some but not all processes and systems with Respondent 2 making reference to the design of platform based solutions that are assisted (involve manual input) and unassisted (does not involve manual input) that adds to this concept. Respondent 6 and 7 still see the business unit at only the infancy of implementing flexible and concepts and state the unit is not very advanced in it with still some way to go. Respondent 7 sees more value in building processes that are modular rather than flexible and adaptable. Respondent 5 disagrees by stating that the business unit employs concepts of reuse to a great degree which speaks to flexibility and adaptability. The respondent further states that the business unit standardizes as much as possible to allow future builds from a system architecture point of view to be done quickly and easily.

Respondents 1,2,5 and 8 also talk to the benefits of flexible and adaptable concepts. Respondents 2 and 8 talk to a similar concept in that it allows for development of new products based on client specific needs as processes and systems allow proactive engagement with the client. Respondent 1 states that it allows for reuse and standardization while Respondent 5 makes reference to the ability to react to risk and use automation to respond to crisis.

Respondent 6 and 7 who state that the concept is still fairly new make reference to the challenges around it. Respondent 6 states that the unit cannot be as flexible and adaptable as they want to be as the banking industry is highly regulated to ensure that specific standards are met and that the business unit is still having difficulty in understanding the data available to make the best use out of it. Respondent 7 states that the business unit is still tied in to legacy systems and it is difficult to transform and break away from it due to the complex functions that they currently handle.

Q11

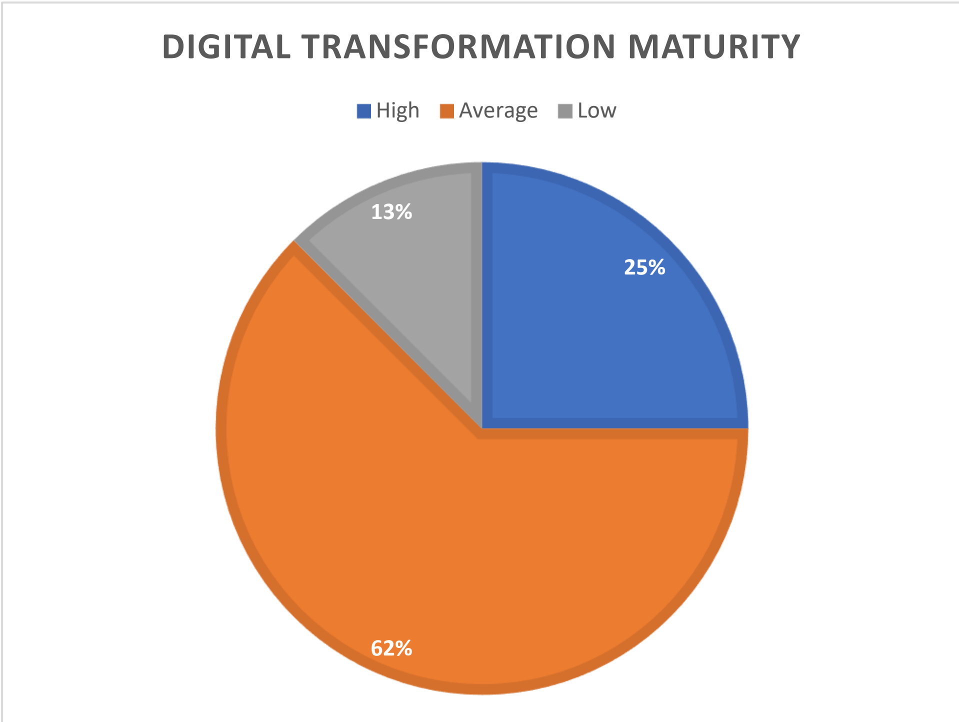
All respondents agree that automated decisioning making is used to a great degree in the current unit. It is used in scorecards in order to evaluate customers for credit, in pre-approval decisions for credit and automated decisioning is built into the models existing in the unit providing decisions. Respondent 2 states that automated decisions are used within systems to provide risk warnings to detect fraud. Respondent 7 agrees with this by stating that data is collected and a decision made to provide early warning triggers in a loan application process.

Respondent 4 states that automated decisioning within systems and processes allows for reduction in manual work and for only higher order decisions to be referred which in turn frees up capacity. Respondents 3,5,6 and 7 agree that automated decisions reduce the amount of staff needed in this unit to perform judgemental decisions. Respondent 2 notes that automated decisions is important as it also provides further input to staff in order for them to perform their tasks more accurately when it comes to making decisions.

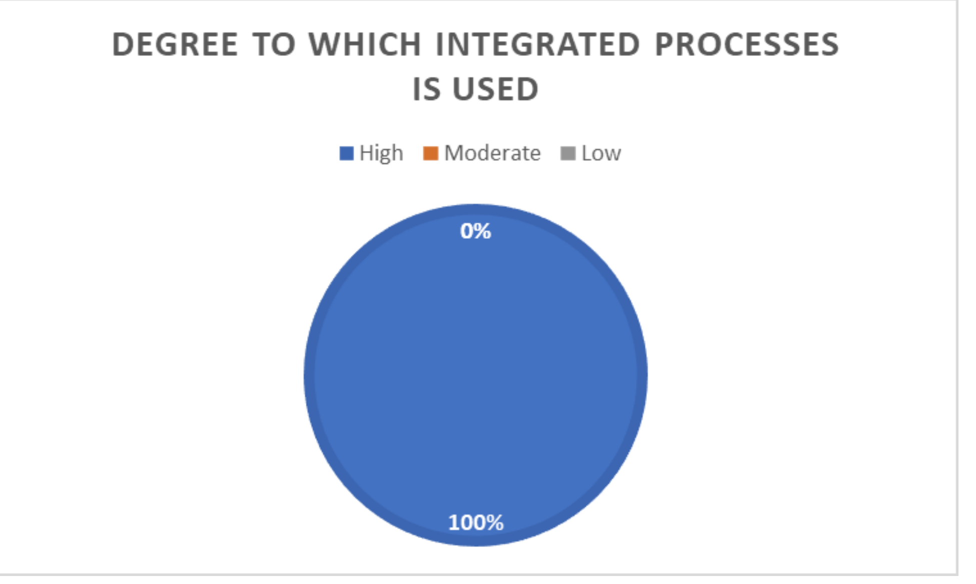
The reduction in manual intervention leads to more consistent and trusted decisions being made according to respondents 3,4 and 8. Respondents 5 and 8 state that this ultimately leads to less error in the unit. Respondents 5 and 7 agree that automated decisioning making adds value by saving time due to less handover points for decisions.

Graphs

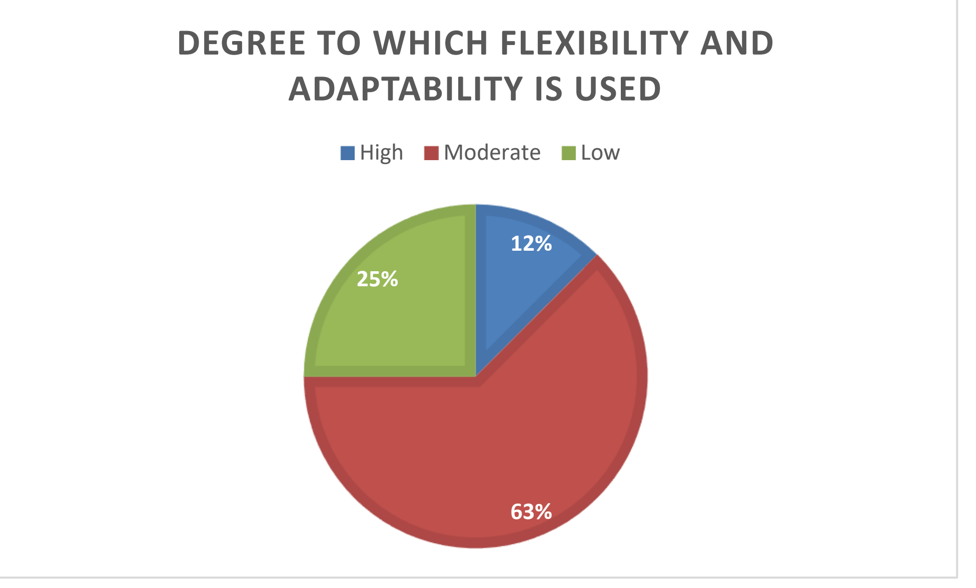
High	Average	Low
2	5	1



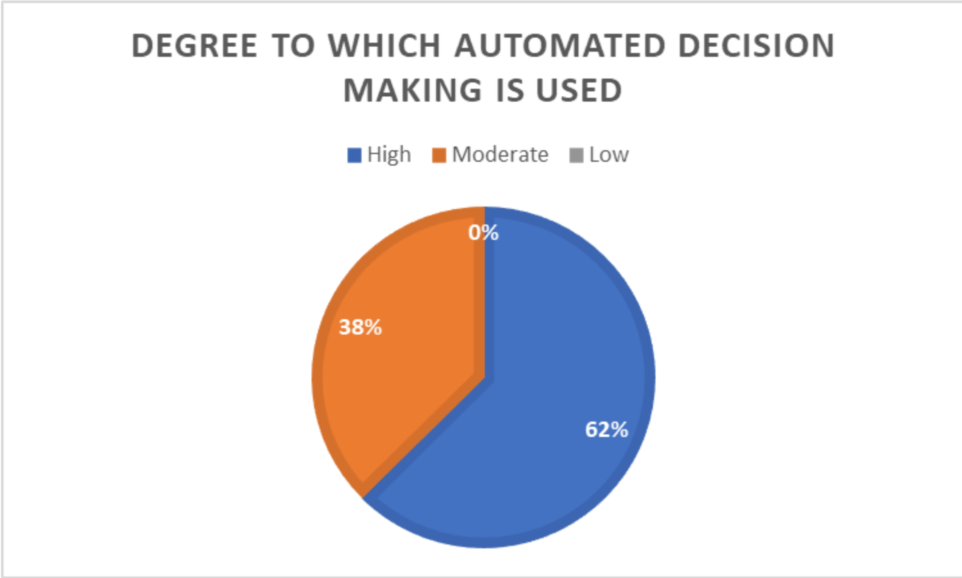
High	Moderate	Low
8	0	0



High	Moderate	Low
1	5	2



High	Moderate	Low
5	3	0



APPENDIX H: THEMATIC CATEGORY 4 ANALYSIS

Coding

Questions	Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9
1st Level Coding	**1st Level Coding**	**1st Level Coding**	**1st Level Coding**	**1st Level Coding**	**1st Level Coding**	**1st Level Coding**	**1st Level Coding**	**1st Level Coding**	**2nd Level Coding**
Questions	**Participant 1**	**Participant 2**	**Participant 3**	**Participant 4**	**Participant 5**	**Participant 6**	**Participant 7**	**Participant 8**	
Tell me how would you describe the changes to the current working environment as a result of digital transformation?	Changes in working methods through digital solutions	Younger workforce	Introduction of digital workers	Outsourcing of skills	Changes to teams	Learn new skills faster	Stressed workforce	Greater opportunity to collaborate	Digital Solutions Collaboration Skill changes Team changes

	Increased collaboration	Digital behaviour being driven	Upskilling workers	Creation of specialist teams	Operational job changes	Universal understanding of data	Expectation to perform multiple tasks		
		Change in skills required	Multiple changes	Back office changes	Employment of new skills				
				Broader skillset required					
Tell me how would you describe the changes to job profiles as a result of digital transformation?	Increase in solutions based roles	Less admin roles	Increase in data based roles	transforming operational staff	Employment of Cas and actuaries	Automation of low and high skilled jobs		automation of admin based roles	Increase in solution/data roles Less admin roles Creation of SME's Increase in other higher function roles Skill within roles Decrease in management Period of job role

	elimination of repetitive work	Providing training	SME experience required	Contract workers employed	moving from operational to solutions	Employees need to go beyond their role	Repurposing admin to data based roles	Training to be provided to transform	
		Repurposing of staff	less capturing between systems	Shifting towards system and data		Digital literacy in roles	Employees with experience will remain		
		Employees to go beyond job role	Repurposing to data roles	Employees to be more agile			Changes in higher skilled workforce		
				employees can perform higher order tasks			Less middle management		

Tell me what do you see as the opportunities for the workforce as a result of digital transformation	Opportunity for roles in process enhancements	Opportunities for younger employees	Knowledge opportunities	Reduces boredom in employees	Opportunities for more skilled people	freeing up capacity for decision makers	Story tellers will be needed	Opportunities to grow into data roles	New roles Knowledge opportunities New way of work Freeing up capacity Content specific knowledge
	Opportunity for roles in solutions space	Training needs realized		Creation of new job roles	Freedom to solve problems	Less mundane jobs	Opportunities for people that work with data	Hiring of automators	
		Providing enhanced skills		Capacity for workforce to learn	Mindset of a solutionist required	Embracing knowledge	Opportunities in API creation	Opportunity for manual testers to grow	
		Explore new roles		Focus on SME knowledge					

Tell me what do you see as the threats to the workforce as a result of digital transformation?	Loss of jobs for unwilling employees	Fear for mature workforce	Becoming redudant	Employees not upskilling themselves	Loss of jobs for employees performing repetitive tasks	Admin and manual job loss	Inability to change	loss of jobs for employees not willing to adapt	Loss of jobs Knowledge gap Change of ownership
	Job loss for workers performing repetitive tasks	Knowledge gap not exploited	Less a threat for management	training courses offered may not be sufficient	unwillingness to change	Threat to employees that don't adapt	Constant need for learning		
	Opportunity outweighs the threat	Change of ownership of tasks		Loss of jobs for employees performing repetitive tasks	Understand more about tech and less about topic				

How have you seen the workforce adapt/take to digital transformation concepts?	Hiring younger and more qualified workforce	motivated younger workforce	hesitant to change	Front line not as adaptive	Workforce accepts inevitability	Data and analytics understanding	eagerness and understanding	hesitant to change	Employee response to change
		Hesitant mature workforce		anxiety with change					
In your opinion describe what further needs to be done to ensure that the workforce is able to perform in an ever changing digital world?	Employee training	Create awareness	Leadership to create support structure	Leadership role	Train workers in more relevant roles	Adaptive learning culture	Need to improve speed of execution	Employees to use training platforms	Leadership role Change management and training

	Leadership role	Equip staff with skill				Train the workforce			

Category Analysis

Q13

Respondents 1,2, and 3 agree that with digital transformation there is a more digital behaviour being driven in day to day tasks. Respondent 1 states that it has provided more freedom to the employee in terms of being able to perform their daily tasks remotely and boosting productivity. Respondent 2 sees digital behaviour being driven in the unit by the policy to not have printers in the working environment encouraging employees to switch from paper based operations to digital solutions. Respondent 3 states that due to availability of data the unit can track inefficiencies and build digital workers to improve turn around times.

Respondents 1 and 2 agree that with transformation comes increased collaboration and gives the ability for employees to work more closely together across departments with the availability of shared data sources.

Respondents 2,3,4,5,6 and 7 make reference to a change in the working environment in terms of the skill required. Respondent 2 states that the unit is actively employing a younger qualified workforce with updated skills on technology and a new perspective. Respondent 3 states that the working environment now includes a culture of employees wanting to upskill themselves. Respondent 4 states that with digital transformation there is a change to the working environment in terms of outsourcing skills for complex functions and bringing in a fresh mindset to the unit. Respondent 5 agrees with Respondent 2 in that the working environment is constantly looking for new skills to keep it updated. Respondent 6 states that with the new skills in the working environment comes the universal understanding of data by employees from low skilled to higher skilled workforce. Respondent 7 has a slightly different view and states that because employees in the working environment are now required to be multi skilled in both non digital and digital solutions it creates a stressed environment that ultimately is hesitant of change.

Respondent 4 sees that the working environment now contains specialist teams with the mandate of exploring new digital solutions. Respondent 5 agrees with this by saying the working environment now has a growth of the size of a team that works with automation or other technology based project and there is a decrease in the size of teams that were administrative.

Q14
Respondents 1,3,4,5,6 and 7 agree that job profiles in solution or data based roles will be increased. Existing employees are being transformed to become a problem solver and understand data.

Respondents 1,2,3 and 8 agree that with digital transformation there will be less repetitive tasks within roles and consequentially a decrease in roles that are administrative based as Respondent 8 states that the functions of these job roles can be easily automated.

Respondents 3 and 8 state that employees with the specific know how of business operations will be transformed into SMEs and will be valuable to the workforce in terms of understanding content specific work.

Respondent 2 states that job profiles will change in such a way that an employee can be repurposed to perform higher order tasks once mundane tasks are automated. Respondent 4 agrees with this. Respondent 5 agrees with the concept by stating that from an employment point of view the job profiles that need to be filled is to understand complex functions and perform business tasks such as chartered accountants and actuaries. Respondent 7 sees changes to job profiles performed by highly skilled workers who make decisions.

Respondents 2 and 7 agree that an employee can no longer perform the role that they were hired more and believe that an employee needs to be multi skilled and able to perform a variety of tasks out of the traditional sense of their job description. Respondent 7 also states that every role whether it is low or high skills enforces a level of digital literacy in an organization in digital transformation. Respondent 4 agrees with this concept by stating that employees need to be agile to go beyond their role.

Respondent 7 sees that with digital transformation there would be less a need for middle management and more a need for leaders and innovators since there is less manual input to manage.

Respondent 4 states that job profiles will be offered more on a contractual basis rather than permanent as systems and processes change and contract workers will work on specific tasks only to implement a specific solution and then move on.

Q15
Almost all Respondents agree that with digital transformation comes new roles and the opportunity for employees to upskill themselves to move into these new roles.

Respondents 2,3 and 6 see opportunities in knowledge with digital transformation by allowing employees to learn new skills through exploring new roles and through participating in training courses offered by the bank.

Respondents 4, 5 and 6 talk to the opportunity of a new way of work. Respondent 4 states that it reduces boredom in employees as there is less manual and mundane tasks to perform and keeps employees interest and productive. Respondent 6 agrees with this. Respondent 5 states that it gives employees freedom to explore and provide solutions and thereby add a solution mindset to their role.

Respondent 2 states that opportunities are realized through freeing up capacity for workers to learn new skill with part of their jobs being more automated. Respondent 7 agrees with this by stating is allows for more capacity for employees in decision making processes if their mundane tasks are automated.

Respondent 3 and 7 believe that employees with content specific knowledge are extremely valuable and that there will always be opportunities for them to share their knowledge to influence decisions.

Q16

Almost all Respondents agree that the major threat to the workforce is loss of jobs. Respondent 6 states that this will be the loss of admin intensive and manual jobs die to automation. Respondents 1,5,6,7 and 8 agree that the loss of jobs will be particularly for employees who are unable to adapt and change.

Respondent 2 fears that the treat to the workforce is not exploiting the knowledge gap. According to respondent 2 this is seeing in particular with the mature workforce who are hesitant to change and are often disregarded yet there is a large amount of useful information they can bring to the working environment. Respondent 3 states that those who do not upskill themselves to bridge that knowledge gap will be left behind. respondent 7 agrees that for those unable to adapt the constant need for learning is a threat.

Respondent 2 states that with digital transformation there is a change of ownership in processes with processes being automated. Respondent 2 states that this creates less accountability on the worker and views this as a threat to the workforce.

Q17

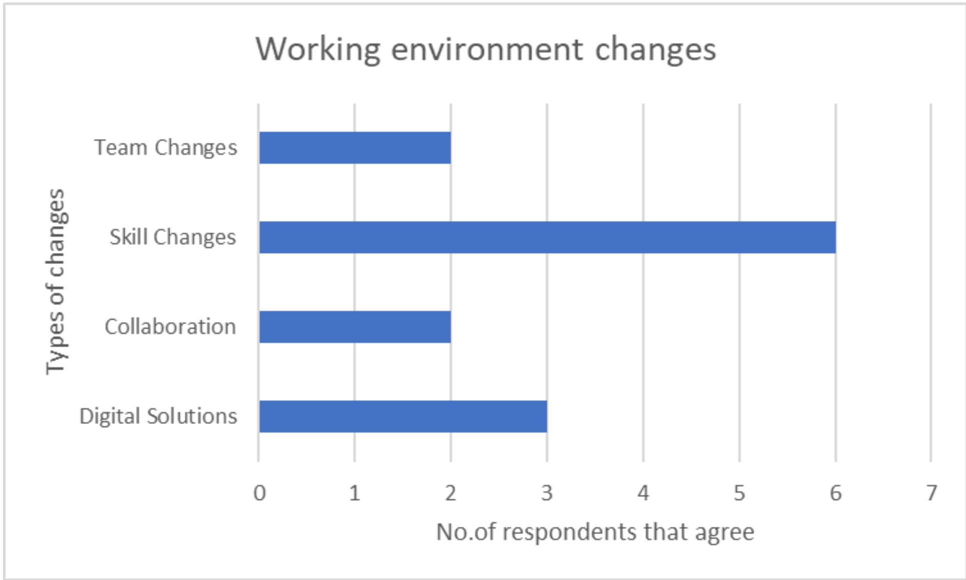
Respondent 8 feels that most employees are not adapting to change and are hesitant to change because transformation takes away extra working tasks. In an the IT space employees get paid for working beyond standard working hours and according to Respondent 8 this is the main reason why the IT workforce does not take change in the business unit as a positive because of the added income it takes away through automation of tasks. Respondent 2 and 3 agree with the employees being hesitant about digital transformation particularly the mature workforce according to Respondent 2 who states that the introduction of new technologies also brings about fear of the unknown for the mature workforce. Respondent 4 sees that back office staff are able to adapt and are used to accepting change more regularly than front line staff who are struggling to cope with the changes introduced to customer facing elements. Respondents 5 and 7 see a different view as compared to the responded discussed with Respondent 7 stating that there is eagerness from the workforce in understanding new concepts. Respondent 5 states that respondents accept change without question because they have come to realize that the change within the business unit is inevitable and they can either adapt or not upskill themselves with the risk of losing their job.

Q18

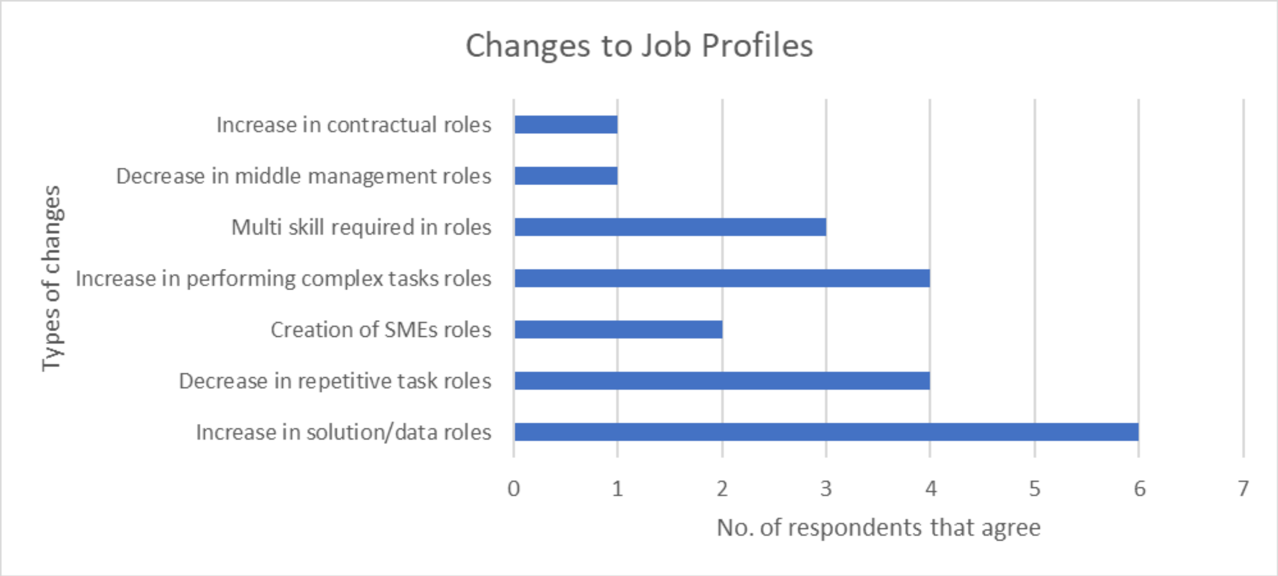
In order for the workforce to adapt in an ever changing digital world there are two categories that emerge in leadership role and change management and training. Respondents 1,2,3,4 and 6 state that the role of leadership in an organization going through digital transformation is critical. Respondent 1 states that it is the responsibility of leadership to ensure that employees are aware of the changes and what is their role in these changes. Respondent 2 also agrees with this by stating that employees throve when there is awareness created by leadership to make employees aware of the business strategy and how employees acceptance of change plays a key role in that. Respondents 3 and 4 agree that leadership needs to create a support structure for employees with Respondent 6 eluding to this by saying that there should be an adaptive learning culture created.

The role of change management and training should not be underestimated according to most respondents. Respondent 1 speaks to continuous education of the workforce and that the business unit needs to equip the workforce with the knowledge tools that they need to do their job. Respondent 2 also agrees with this. Respondent 5 and 6 recognize the importance of the workforce being trained on their job. Respondent 5 states that the unit needs to start training employees in the relevant roles for example training workers on what changes mean for their job rather than training them on a specific system as Respondent 5 recognizes that systems change continuously in this business unit. Respondent 8 does agree that training needs to be provided to the workforce but believes the responsibility is more on the employee to ensure that they make use of training resources provided by the business unit.

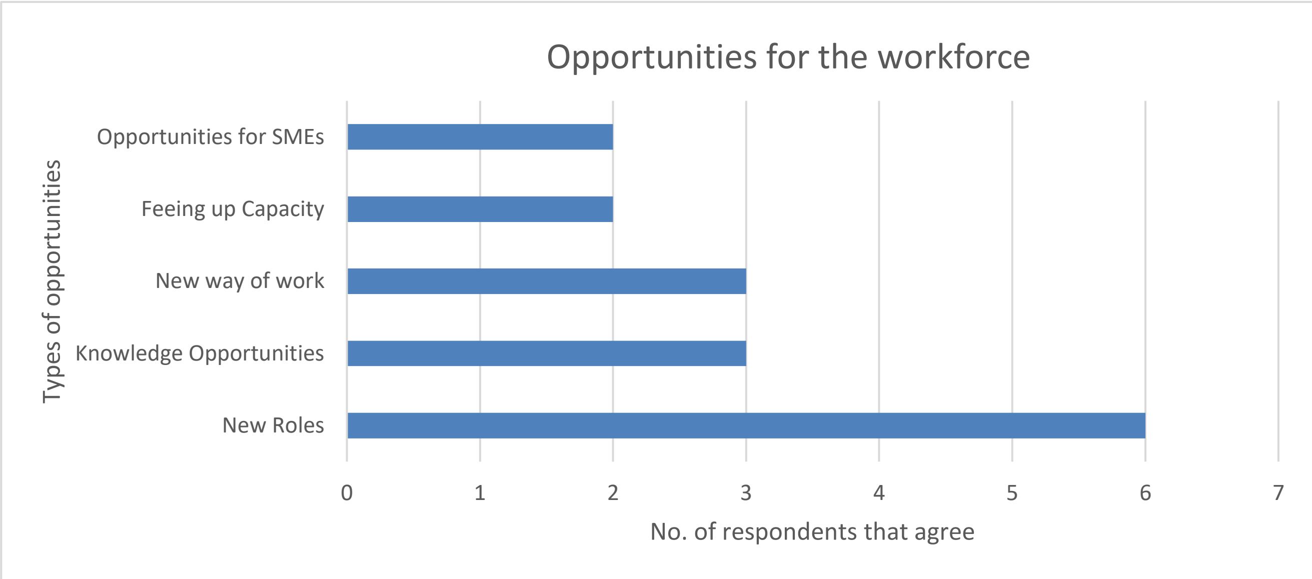
Graphs

Digital Solutions	Collaboration	Skill Changes	Team Changes	
3	2	6	2	

Increase in solution/data roles	Decrease in repetitive task roles	Creation of SMEs roles	Increase in performing complex tasks roles	Multi skill required in roles	Decrease in middle management roles	Increase in contractual roles
6	4	2	4	3	1	1



New Roles	Knowledge Opportunities	New way of work	Feeing up Capacity	Opportunities for SMEs
6	3	3	2	2



Loss of jobs	Knowledge gap	Change of ownership
7	3	1