The Impact of Industry 4.0 on the Workforce Within a Business Banking: Projects and Operations Environment

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Abstract

Industry 4.0 is a concept that is critical for organizations to adopt 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. This study sought to evaluate the impact on the workforce of the implementation of Industry 4.0 in a Business Banking: Projects and Operations environment in a particular Bank. A qualitative research approach was undertaken using semi-structured interviews with eight subject matter experts within the unit. 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

Keywords
Industry 4.0, Digital Transformation, Digitization, Banking and Workforce.

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 and Romero (2017) describe 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 and 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 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 the 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 focuses 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. This study, thus, sought to investigate the Impact of Industry 4.0 on the workforce within the Business Banking Projects and Operations unit. This lead to the development of a conceptual framework to understand the possible implications of the concepts of Industry 4.0 on the workforce.

2. Literature Review

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 are 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.

2.1 Interconnectedness

Managing the 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. 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.

2.2 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 i.e. 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.

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.

2.3 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.

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).

2.4 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 and Cevikcan 2017).

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 and 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 and 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 and 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.

Contrary to this, some researchers argue that technological advancements will result in job losses and lower wages as labour is replaced through automation. Frey and Osborne (2017) undertook a study within the US Labour Market to assess the susceptibility of jobs to computerization across 702 occupations. 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.

In a study conducted by Bonekamp and 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.

2.5 The Need for Industry 4.0 in the Banking Sector

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 and 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. The second being leveraging ecosystems which is done by collaborating with partners to develop new services. 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.

2.6 The Application of Industry 4.0 in the Banking Sector

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.

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.

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.

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.

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.

3. Methods

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 and Sutton, 2014). Within the qualitative approach appropriate questions were developed 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.

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.

4. Data Collection

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. 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. 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, 2016). 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. 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 and Clarke (2006) was utilized.

5. Results and Discussion

5.1 Reasons for aligning to Industry 4.0 principles

From the analysis conducted 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.

5.2 Most relevant technologies

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, 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 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.

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.

5.3 Value for the Customer

The business unit focuses on credit solutions and it's day to day task is to optimize credit systems, operations, and products. 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.

5.4 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.

5.5 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.

5.6 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

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).

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.

5.7 Modification of the working environment

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. Weber (2016) agrees with this and 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.

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 (Figure 1).

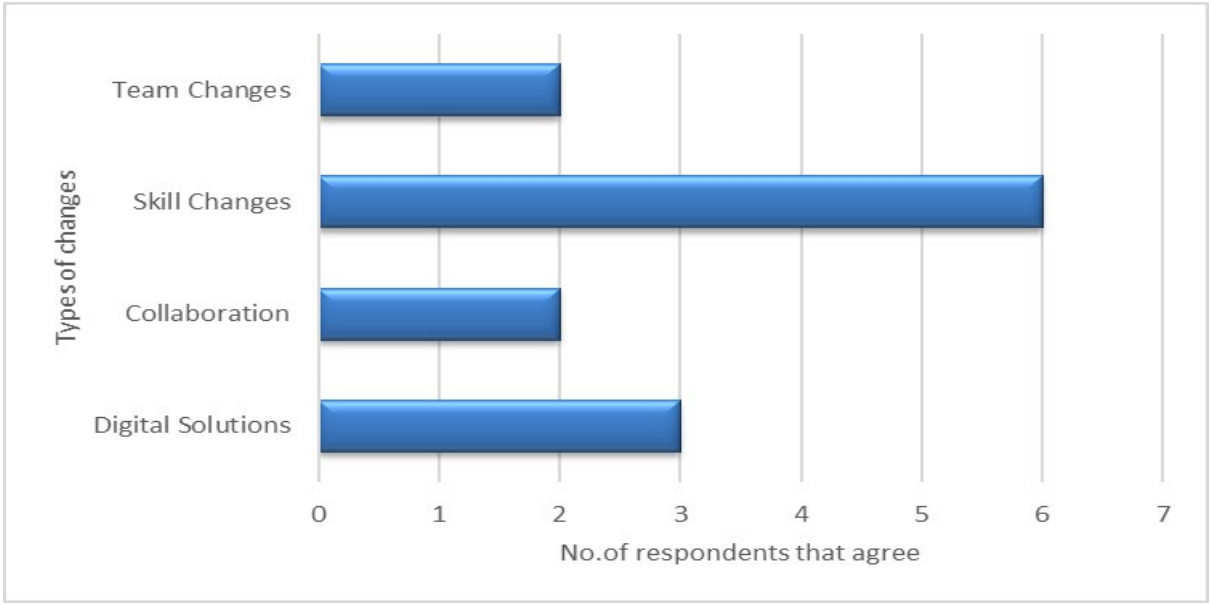

Figure 1. Changes to working environment

5.8 Modification to job profiles

Corresponding to the research conducted by Boston Consulting Group (2015) and Manyika and 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 are also related to the skill of employees to perform higher order or complex tasks.

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 and 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 and 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, and 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 (Figure 2 and figure 3).

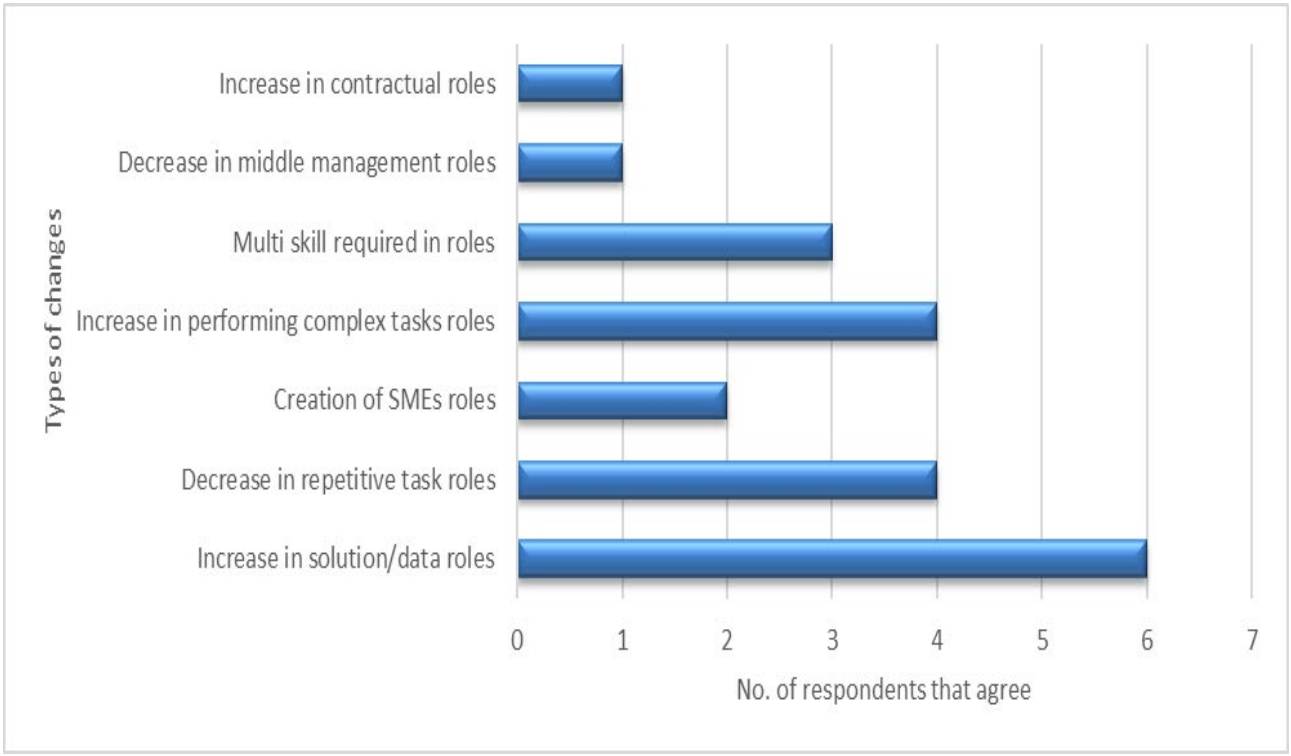

Figure 2. Changes to job profiles

5.9 Conceptual Framework

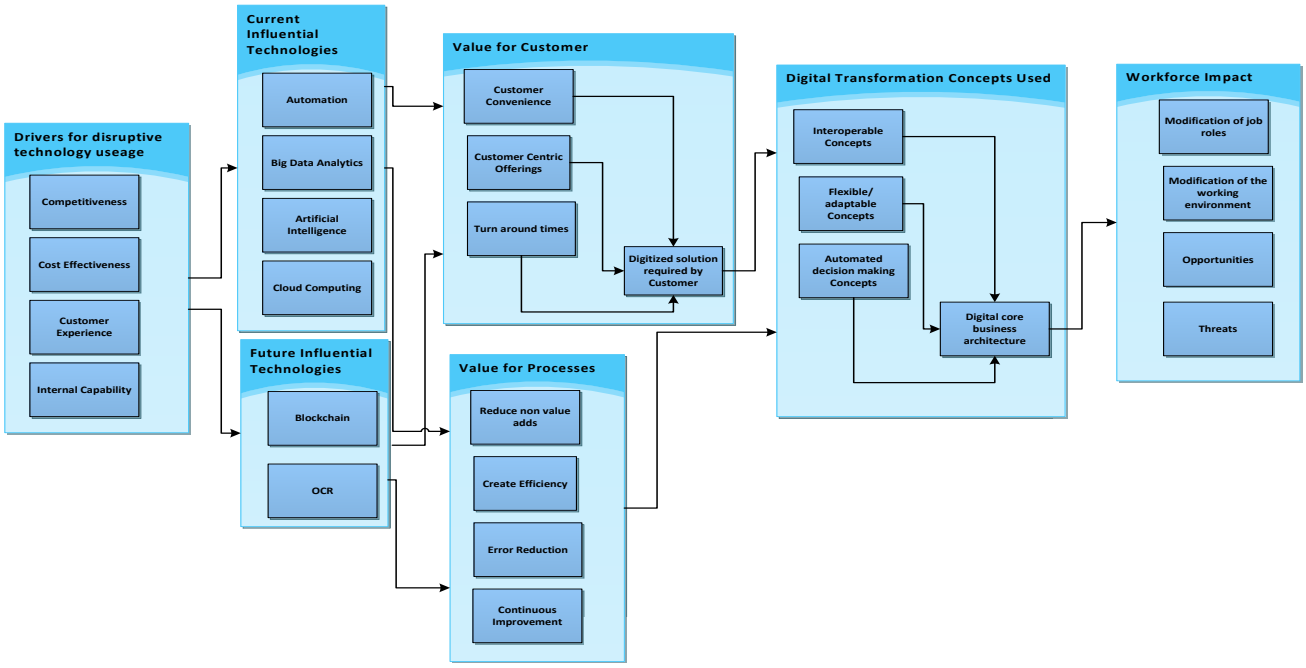

Figure 3. Final Conceptual Framework (developed by Author)

6. Conclusion

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.

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