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Impediments to the Adoption of Business Process Automation (BPA) in a South African Investment Bank

Dissertation by

by

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ABSTRACT

This research study aimed to investigate factors that impede the adoption of automation in business processes in the South African investment bank situated in Johannesburg. The study was grounded by the theory of constraints (TOC) to address the research questions and objectives.

The qualitative research study employed the interpretivism philosophical orientation to develop an understanding of participants' dynamic responsibilities and understand how individuals construct meaning out of different contexts. Data was collected through semi-structured interviews with IT leaders and professionals in the investment bank. Thematic data analysis was employed to analyse the data and derive insights.

Findings were presented using the technology, organisation, and environments (TOE) approach. Key findings were around technical and integration incompatibilities, legacy systems, lack of research and development facilities, and lack of technical knowledge sharing. Moreover, organisational impediments were around decentralised centre of excellence (CoE), job insecurity, lack of advanced automation skills, and lack of formal logging process for new projects.

Management implications recommended that IT system users be included in all phases of projects to manage job insecurity. Develop a research and development facility where users can explore new technologies and solutions in real-life use cases. Embed the CoE team in business units to equip them with depth business and system understanding. Lastly, implement measuring and monitoring processes to track the development and benefits of each automation.

Future research should investigate the impediment of business process automation in a different industry, such as manufacturing which is a leader in automation. Secondly, conduct a comparative study in developed countries such as China which is a leader in technological innovation.

KEYWORDS

Business Process Automation (BPA), Innovation, Centre of Excellence (CoE), Qualitative

DECLARATION

I declare that this research report is my work. The report is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration (MBA) at Wits Business School (WBS). I obtained the necessary authorisation and consent from relevant stakeholders to conduct the research. I did not use another student's previous work and submitted it as my own. I did not allow and will not allow anyone to copy my work to present it as theirs. The University's plagiarism policy is available at: https://libguides.wits.ac.za/plagiarism_citation_and_referencing/plagiarism_policy

Signed: Matete Malope (2508295)

28 February 2023

Date

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1. INTRODUCTION AND PROBLEM STATEMENT

1.1. Introduction

Through an exploratory approach, the qualitative research study aims to investigate the impediments to adopting business process automation (BPA) in an investment bank in Johannesburg, South Africa. The research will concentrate on the investment bank's IT leaders and professionals. Moreover, research insights will be applied for academic and business benefit. The remainder of the chapter will discuss the research study's problem definition, background, and rationale for the research study.

1.2. Problem definition and purpose

Recent events have demonstrated how rapidly organisations and industries must constantly innovate to remain competitive. Organisations across the globe are spending billions of dollars in technological investments and research and development (R&D), where companies such as Amazon and Google spent over $43 billion and $27.6 billion, respectively, in 2020, which constitutes 10-15% of their annual revenue (Statista, 2023).

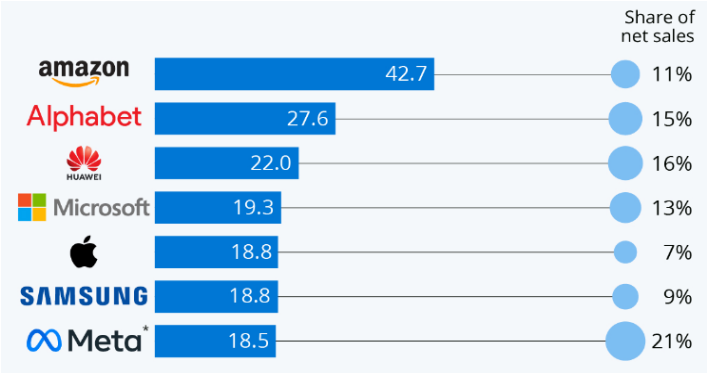

Figure 1: Companies with the highest R&D investment expenditure in 2020 (in billion U.S. dollars), Adapted from (Statista, 2023)

Organisations are spending this money on R&D to constantly innovate their technology, processes, methodologies, and systems, ultimately allowing them to remain competitive and potentially expand into new markets. Literature maintains that organisations that invest in their R&D tend to be ahead of the competition and

remain profitable (Mckinsey and Company, 2023). Nevertheless, literature shows that the banking and finance sector is one of the least innovative industries; the finance and banking industry only invests 5% to 7% of their yearly revenue in R&D (Mckinsey and Company, 2023). The figure below shows the top organisations by industry that invest in R&D and innovation.

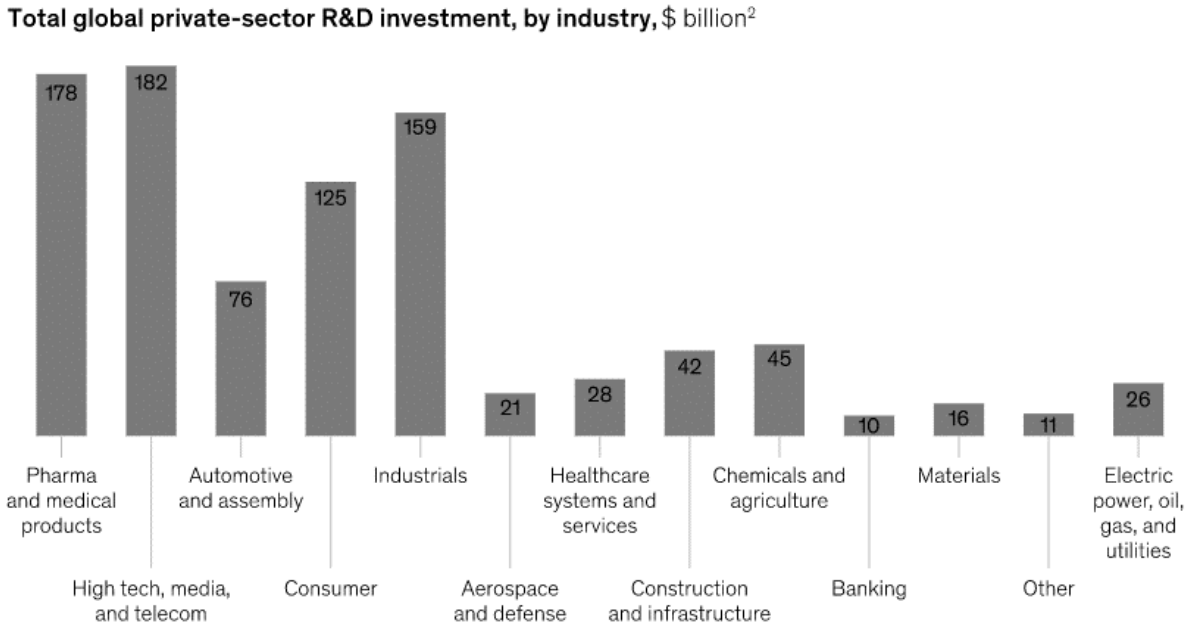

Figure 2: Total global private-sector R&D investment by industry, $ billion, Adapted from (Mckinsey and Company, 2023)

Figure 2 above shows that globally, banking invests the least in innovation, with only $10 billion, while industries such as high tech, media, and telecom are spending figures as high as $182 billion on research and development.

Furthermore, Gartner (2022) maintains that business process automation is no longer an option for organisations but a requirement for their survival. Gartner (2022) further forecasts that business process automation will grow by an average of 20% year-on-year, with a projected market value of over $600 billion for automation-enabled software by 2022. At the same time, Robotic Process Automation (RPA), an accelerator of business automation, is set to reach over $1.12 billion in 2025.

Despite the advances and possibilities presented by business process automation, it is often a challenge for organisations to automate their business processes (Balakrishnan & Dwivedi, 2021). There are different reasons for the impediments to the adoption of innovation in organisations, Liermann, Li, and Waizner, (2021) argue the main reason for the adoption of innovation in the organisation are financial constraints, lack of technical skills, lack of automation strategy and lack of tools in the organisation. These impediments prevent organisations from achieving their automation and technology transformation goals.

Davenport and Brain (2018) provide a simple key principle to a successful business process automation strategy for organisations, "*before automating your company's processes, first find ways to simplify and improve them*". This statement suggests that organisations should start by streamlining their business processes, removing inefficiencies before attempting to automate them, thus simplifying the automation required, thus eliminating unnecessary processes and tasks.

This research study will employ a qualitative method of semi-structured interviews to gather insights on impediments to business process automation in the South African investment bank (Lindgren et al., 2020). At the end of the research study, collected data will be analysed and interpreted to draw insights, and then management implications will be provided concerning the literature. The study results will benefit the investment bank as informed feedback that can be applied for future improvements.

1.3. Problem statement

Technology is advancing at an exponential rate, and parallel to that, the need for organisations to be more dynamic and agile has increased in the last decade (Wu, 2020). Rapid advancements in technology and changing consumer demands have accelerated the need for organisations to automate their business processes to remain competitive in their respective markets (Ansari et al., 2019). According to Gartner (2022), organisations that do not automate their business processes and innovate will lag from their competitors and be disadvantaged.

Experts have identified benefits that organisations can realise by adopting business process automation in their organisations. However, some organisations, including banks, are inadvertently not taking advantage of these benefits due to many reasons, which include a lack of skills in the organisation and a lack of financial budgets, as highlighted (Davenport & Brain, 2018). Kuberkar and Singhal (2020) further provide significant challenges that hinder adopting innovation and automation in business processes. These include a lack of skills in the organisation, deficiency of financial budgets, and unsupportive organisational culture.

Furthermore, UiPath, a leading robotics process automation (RPA) software company, surveyed 502 senior executives, which include CEOs, CIOs, and CTOs from large to medium enterprises with revenues between $250 million and over $1 billion (Lafrate, 2019). The survey found that 88% of senior executives believe automation can accelerate human achievement and business efficiency. However, the survey shows that only 28% of these organisations have adopted advanced automation. Gartner (2022) projects advanced automation to have an annual growth of over 40.6% from 2020 to 2027 and a market capitalisation of over $600 billion. This figure indicates that more organisations are not taking advantage of business process automation and its benefits.

This study will employ qualitative research to investigate impediments to adopting BPA in a South African banking investment bank. The research study will draw insights from IT leaders and professionals within the bank through semi-structured interviews.

1.4. Research questions and objectives

To achieve the objective of this research study, research questions have been categorised into sections to ensure they are clear and manageable. The following research questions intend to understand the challenges the investment bank is experiencing with adopting BPA and its implications. To rationalise this research question, we will adopt the theory of constraints (TOC). Goldratt (1990) maintains

that the theory of constraints identifies constraints that prevent the organisation from achieving its strategic objectives.

1.4.1. Main research question:

"What challenges do South African banks encounter when automating their business processes?"

1.4.2. Sub-research question 1:

"How does technological context affect the adoption of automation in business processes?"

1.4.3. Sub-research question 2:

"How does organisational context affect the adoption of automation in business processes?"

1.4.4. Sub-research question 3:

"How does the organisation's environmental context affect the adoption of automation in business processes?"

To successfully answer these research questions, the researcher will collect qualitative data from IT leaders and professionals of the identified organisation using semi-structured open-ended interviews. After that, the data will be analysed using thematic analysis to draw insights (Braun & Clarke, 2006). The outcome of these research questions will help organisations that want to automate their business processes to be cognisant of challenges they may encounter and further allows them to assemble a risk mitigation strategy to avoid failure.

1.5. Expected Research Contribution

1.5.1. Practical contribution

Research insights will help readers and organisations understand the impediments affecting the adoption of business process automation in the South African investment bank. Research insights will provide readers and other organisations with information to make informed decisions when adopting

business process automation into their organisations. Moreover, the contribution will provide other banks in South Africa and other countries with real-life case studies and scenarios of business process automation solutions they can adopt and integrate into their business processes.

1.5.2. Theoretical contribution

Research insights will add to the body of knowledge by providing fellow researchers with tools and methodologies for collecting, analysing data, and drawing insights, further allowing them to replicate the study in other settings.

1.6. Assumptions

Multiple realities exist in every research study, the reality of the researcher, the research participants, and the reader (Oates, 2006). Hence it is critical to note potential assumptions in this research study. Firstly, the researcher will assume that IT leaders and professionals participating in the study are technologically savvy and fully understand the organisation's automation needs. Secondly, the researcher will assume that all participants will be truthful in their responses.

1.7. Significance

As organisations expand and business processes become complicated, more and more organisations find themselves with business processes that are redundant and isolated. These redundancies and disintegration often cause inefficiencies in the value chain and result in higher operating costs and system lag (Kaur et al., 2020). Moreover, organisations that do not automate their business processes risk losing their competitive edge. Similarly, Gartner (2022) argues that business process automation is no longer an option for organisations but a necessity for survival. However, some organisations lack behind for multiple reasons and have not realised the benefits of automating their business processes, while some have faced factors impeding their automation journey (Akbar et al., 2020).

In retrospect, the qualitative study will provide insights into the impediments affecting the South African banking sector regarding business process automation in their organisations. These insights drawn from IT leaders and professionals in the organisation will highlight and address challenges potential automation adopters should consider when integrating automation into their business processes. Moreover, the research study will offer management implications to adopt and avoid, mitigate, or transfer these risks; and take advantage of the benefits presented by BPA.

1.8. Dissertation structure

The dissertation is distributed into seven chapters, and this section describes what each chapter entails.

- CHAPTER 1: INTRODUCTION – Introduce the research study by providing the background of the study, highlighting the problem statement, discussing research questions, and discussing the significance of the study as well as providing a brief research structure.

- CHAPTER 2: THEORY AND LITERATURE REVIEW – Provide a detailed review of previous work on the research phenomenon by other researchers in the business process automation discipline. The literature will be recent, relevant, and credible.

- CHAPTER 3: THEORETICAL BACKGROUND AND CONCEPTUAL FRAMEWORK – Discuss the research study's theoretical background and the adopted conceptual framework.

- CHAPTER 4: METHODOLOGY – Discuss the methods employed during the research study. These include philosophical orientation, data collection, and data analysis methods.

- CHAPTER 5: ANALYSIS AND INTERPRETATION OF FINDINGS – Analyse and interpret the interview data to draw insights.

- CHAPTER 6: DISCUSSION OF RESULTS – Discussion of research insights concerning the literature.

- CHAPTER 7: CONCLUSION AND RECOMMENDATIONS – The final chapter will summarise and package the findings into a conclusion. After that, provide management recommendations and suggestions for future studies.

1.9. Conclusion

This chapter started by discussing the background information of the phenomenon of interest and the purpose of the research study. The purpose of the study is to investigate factors hindering the adoption of BPA in a South African investment bank. Moreover, the chapter also discussed the research questions and the theoretical and practical contributions of the research study. Lastly, the structure of the dissertation has been outlined and briefly discussed, which consists of the introduction, literature review, methodology, analysis and interpretation of results, and conclusion and recommendations chapters.

The following chapter will discuss the theory and literature review governing the phenomenon of interest.

2. THEORY AND LITERATURE REVIEW

2.1. Introduction

The dynamic and fast-paced business environment requires efficiency and agility more than ever. Through automation, business efficiency and agility can be attained (Gartner, 2022). Furthermore, the Industrial Development Corporation (IDC) report forecasts that the worldwide economic impact of converged automation powered by artificial intelligence technologies will be close to $3 Trillion by the end of 2022 across all businesses and IT functions (IDC, 2023). Moffitt et al. (2018) suggest that it is more critical than ever for organisations to invest in intelligent automation technologies and skills if they want to remain competitive in their segments. Gartner (2022) further adds that organisations that do not invest in advanced automation technologies and skills will be disadvantaged.

Moreover, Plessis (2017) provides some of the benefits organisations can realise by strategically integrating automation into their business processes. These benefits include higher productivity, lower operation costs, increased flexibility, increased efficiency, improved quality of output, and increased sustainable competitive advantage.

2.2. Business Process Automation (BPA)

Gartner (2022) defines business process automation (BPA) as a combination of automation technologies for automating complex business processes. Gartner (2023) further adds that automation can supplement human capabilities by allowing them to execute tasks more efficiently, faster, and with fewer errors. BPA has an added advantage over other automation techniques that use a single automation technique. Romao et al. (2020) maintain that BPA leverages multiple automation technologies and techniques, allowing organisations to automate manual and time-consuming tasks, enabling scalability. Moreover, Gartner (2022) has identified business process automation as the number one strategic technology trend for 2020.

With the growing trend of business process automation, organisations need a comprehensive understanding of how and when to integrate automation into their

business processes (Romao et al., 2020). Du Plessis (2017) argue that organisations must understand that integrating automation into their business processes does not replace human capabilities. Instead, business process automation allows the organisation to free employees from mundane and low-value duties, thus allowing them to channel their energy into value-adding activities. Vishnu et al. (2017) further adds that organisations that strategically incorporate BPA see a profit increase of over 20% compared to organisations that do not automate their business processes.

Moreover, the IDC predicts that IA associated with CRM could boast revenues of over $1.1 trillion between 2017 and 2021; the vast among of revenue will be contributed by increased productivity ($121 billion) and reduced operational expenses due to automation ($265 billion). The type of AI technology organisations expressed to adopt ranges from machine learning (25%), voice recognition, and natural language processing (30%) to advanced numerical analysis and text analysis (31%) (IDC, 2023).

2.2.1. Allied technology for BPA

Figure 3 below depicts the variety of versatile technologies that form part of business process automation. The figure is adopted from Haleem et al. (2021).

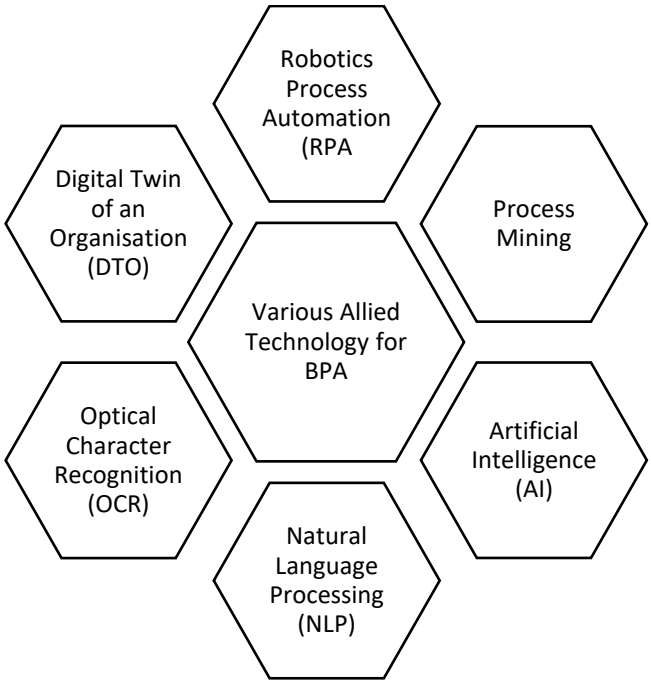

Figure 3: Various allied technology for advanced business process automation, Adapted from (Liermann, Li, & Waizner, 2021)

The section below will briefly describe each technology associated with BPA, as depicted in figure 3 above.

- Robotics Process Automation (RPA): A software application that makes it easy to build human-assisted solutions that imitate human actions interreacting with an IT application or process (Ansari et al., 2019).

- Process Mining: Data science process that analyses a chain of events that consists of defined steps from the start of the activity to completion.

- Artificial Intelligence (AI): Advanced algorithms or a combination of algorithms that simulate human intelligence to make decisions.

- Natural Language Processing (NLP): Closely related to AI, NLP is concerned with the interactions between human languages and computers, particularly how computer programs interact with everyday human languages via text or speech (Ansari et al., 2019).

- Optical Character Recognition (OCR): Responsible for automating data extraction from printed or written documents and converting those documents into machine-readable documents (Awel & Abidi, 2019). These soft documents can then be used as soft copies for data processing or editing.

- Digital Twin of an Organisation (DTO): Dynamic software application that models an organisation's operating model to understand the current state of an organisation, how the organisation responds to change, and can also run scenarios of a decision made in the organisation to predict the outcome.

Davenport and Brain (2018) argue that business process automation is more than just a set of software or technology but also incorporates process

discovery, process optimisation, process monitoring, and all the planning and development methodologies involved.

2.2.2. The evolution of BPA with a focus on robotics process automation (RPA)

Process automation has evolved significantly in the past decade. BPA techniques matured from a structured, rule-based, and analogue process; to now intelligent automation that can make decisions on its own using a combination of technologies such as machine learning (ML) and artificial intelligence (AI) (Balakrishnan & Dwivedi, 2021).

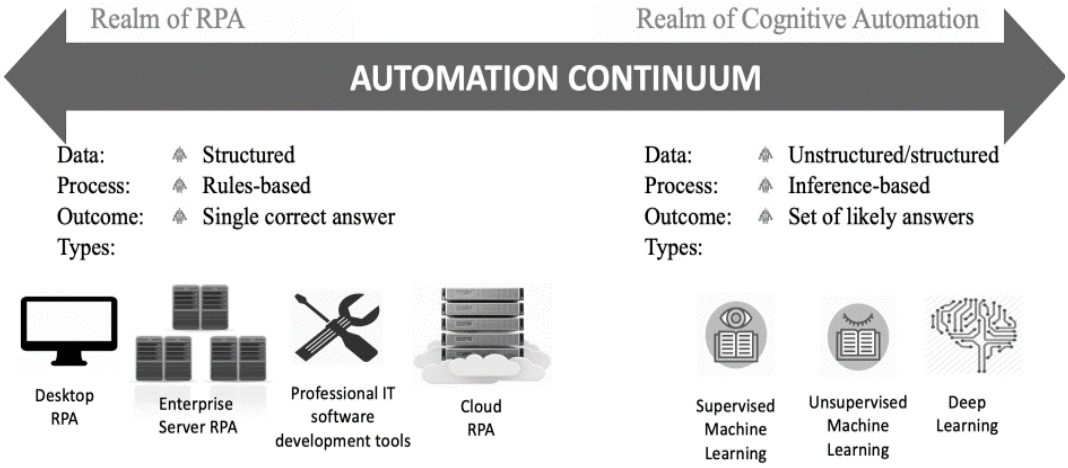

Figure 4: The evolution of business process automation, Adapted from (Alberth & Mattern, 2017)

Figure 4 above depicts the evolution of business process automation, which evolved from standard automation to more advanced automation, which can make human-like decisions independently.

Alberth and Mattern (2017) define robotics process automation (RPA) as the type of automation that uses software, commonly known as “robot”. This software integrates with applications already in organisations, thus enabling data manipulation, transaction processing, and overall communication between multiple IT applications or systems.

Vishnu et al. (2017) accentuate that multiple robots can be considered a virtual workforce which operates in the backend without human intervention. Alberth

and Mattern (2017) further argue that there are financial benefits to owning robots that can mimic human behaviour on applications which trumps paying salaries and managing people. Other non-financial benefits of implementing RPA include improved accuracy, operational flexibility, and scalability.

Unlike other types of automation, RPA is unsuitable for automating all tasks and processes. Castillo et al. (2021) maintain that RPA is suitable for automating business processes that are repetitive and predictable, unlike intelligent automation (IA) and business process automation, which can make decisions and adapt themselves based on the given input. RPA works well for processes that typically lack the scale or value to warrant automation via core systems transformation or if core systems transformation is not due to be implemented soon (Vishnu et al., 2017). An advantage of RPA tools is that they can improve the efficiency and effectiveness of business processes without altering or changing the underlying functionality of business applications or systems (Vishnoi et al., 2019).

2.3. Automation of Legacy systems: Opportunities

Organisations find themselves with legacy systems that serve as pillars of their operations, and legacy systems are often difficult to replace and complex to replicate. Benbya et al. (2020) maintain that legacy systems lack support and limit growth potential. However, many researchers believe challenges organisations still face using legacy systems can be addressed by adopting automation technologies such as BPA, artificial intelligence (AI), and robotic process automation (RPA).

Besides legacy systems, systems that operate in silos but perform co-dependent functions can be automated using BPA (Lasso-Rodriguez & Winkler, 2020). Vishnoi et al. (2019) highlight that, on average, large organisations have over 15,000 information technology (IT) systems, while medium enterprises have over 4000 IT systems. These IT systems are categorised into manageable buckets, namely front-office (FO), which comprises customer-facing systems allowing customers to interact with the organisation. Back-office (BO) includes processing and reporting systems that help the organisation increase efficiency. Lastly,

employee productivity tools such as Microsoft Teams assist employees in performing their tasks in the workplace (Vishnoi et al., 2019).

Based on literature from multiple authors such as Lasso-Rodriguez and Winkler (2020); Narayan (2018); Alberth and Mattern (2017), there is an evident lack of interaction between FO and BO applications in most organisations. Siloed IT applications are disintegrated, thus causing inefficiencies and duplications in business processes. Which often requires employees to bridge the gap between these IT applications by performing a mundane and manual operations (Gažová et al., 2022). Therefore, it poses a business continuity risk to the organisation; for instance, should one process break, it can affect the entire chain, and it is often time-consuming to identify the root cause (Kaur et al., 2020).

2.4. Centre of Excellence (CoE)

A centre of excellence (CoE) is a critical component of any organisation that intends to accelerate digital transformation across its business. Curry et al. (2021) define CoE as a virtual or physical entity that capitalises on the knowledge and expertise already in the organisation. The purpose of a CoE is to provide the organisation with the ability to innovate rapidly. The CoE focuses on a tight scope around a specific capability such as BPA (Larsen, 2020). CoE should strive for above-average performance to deliver incremental value to the organisation. CoE should not conduct business-as-usual (BAU) functions but rather on-demand and value-adding solutions (Curry et al., 2021).

According to a survey by Gartner (2022), 69% of marketers plan to deploy an analytics CoE in their organisations by 2017. One case study contends that building a successful CoE has decreased the cost of building new workflows by more than 70% in just eight months. The CoE has provided the organisation with the ability to proactively predict customer needs which further allowed the organisation to be more efficient and profitable (Gartner, 2022). The following section provides six steps organisations can adopt to build a successful CoE capacity.

- Design standards and best practices.

- Build a strong team with diverse skillsets and strong knowledge.
- Acquire an arsenal of reusable components.
- Establish stable and monitored environments.
- Focus on continuous process improvement.
- Establish consistent governance.

Despite the efficiency and cost benefits that CoEs present to the organisation, the literature also argues there are disadvantages to the CoE. Curry et al. (2021) maintain that CoEs reduce business agility and responsiveness as they tent to develop narrow skill sets and tend to be isolated from the business units they support.

2.4. Effects of Entrepreneurial Orientation (EO) on innovation

The literature presents that entrepreneurial orientation (EO) positively affects innovation in the organisation (Alegre & Chiva, 2013); this includes both exploratory and exploitive innovations (Kollmann & Stöckmann, 2014). EO additionally affects new product success and speeds up the release of new products to the market (Clausen & Korneliussen, 2012). Innovation can be classified based on its ability to impact change; for instance, innovation can be incremental or radical. Incremental innovation adds a minor impact on existing creations, while radical innovation has an impact and, in other cases, causes disruptive changes to a product or industry (Story et al., 2009).

Literature suggests that entrepreneurial proactiveness, autonomy, risk-taking, innovativeness, and competitive aggression affect innovation creation (Gažová et al., 2022). Entrepreneurial proactiveness increases enthusiasm in the organisation, which increases alertness to new market opportunities (Engelen et al., 2014). Entrepreneurial orientation emphasises innovation, "innovation is generally considered as the exploration of new things that did not exist before" (Cho & Pucik, 2005).

Entrepreneurial orientation represents a favourable opportunity for experimentation and reduces red tape, often averting unconventional ideas from

manifesting in the organisation. Entrepreneurial organisations participate in opportunities and solutions with uncertain outcomes, often with the greatest rewards (Miller, 2011). Entrepreneurial culture focuses on autonomy which increases self-confidence, thus allowing teams and individuals to experiment more with less supervision and fear of failure (Real et al., 2014). Entrepreneurial orientation requires organisations to be aggressive to overcome competitors by constantly introducing new innovative products through experimentation and risk-taking (Sethi et al., 2008).

Moreover, Innovation requires financial investments and a willingness to take risks; usually, greater risk yields greater rewards (Lumpkin & Dess, 1996).

2.5. Innovation as an accelerator of BPA

Over the last decade, there have been immense technological innovations in the market, both incremental and radical such as machine learning, business process automation, cloud technology, content streaming, big data, and facial recognition, to name a few (Curry et al., 2021). Morrar et al. (2017); Geiger and Sá (2013) maintain that these technological advances have formed a perfect symbolic relationship that creates new concepts for transforming the market into one new era of competition, product differentiation, and revolutionising industrial processes.

In the new era of dynamic technological advances, traditional competitive factors such as access to resources, economies of scale, and market share are now linked to other factors such as access to knowledge, intellectual property, innovation, and intelligent technology (Buhr, 2017). Moreover, the consumer's role has also changed significantly in the past decade, where organisations need the right information about the consumer to build a more interactive relationship that can meet customers' individual needs (Geiger & Sá, 2013).

Literature maintains that organisations are expected to implement and modify innovative business models and insert flexible value chains to enhance their ability to respond to consumer behaviour and needs changes (Geissbaueret al., 2014). Innovative organisations with intelligent business processes will meet these

consumer demands while maintaining high-quality products and services (Buhr, 2017).

Agrawal et al. (2018) maintain that new product development and innovation require design thinking, market research, and customer feedback. They further add that agile, flexible, and powerful technological tools are required. These are the requirements presented by BPA, which is a collection of advanced technological tools such as robotic process automation (RPA), artificial intelligence (AI), and machine learning (ML), to name a few (Qin et al., 2016).

Greater automation adoption and integration into business processes will positively impact the company's performance (Rubera et al., 2016). Similarly, if automation is strategically integrated into the organisation's business processes, the organisation's performance will improve. Moreover, Prajogo and Ahmed (2006) highlight that innovation in the manufacturing sector is more radical than in the services sector and has a greater impact on the firm's performance. Innovation in the banking industry, being the service industry, will lean more towards incremental innovation (Alegre & Chiva, 2013).

2.5. Conclusion

The dynamic and fast-paced business environment requires more efficiency and agility than ever, which BPA can achieve. Integrating BPA does not replace human capabilities altogether; instead, BPA allows the organisation to free employees from mundane and low-value duties, thus allowing them to channel their energy into value-adding activities. Legacy systems that serve as pillars of their operations, these legacy systems are often difficult to replace if and complex to replicate. The purpose of the CoE is to provide the organisation with the ability to innovate rapidly. The literature presents that entrepreneurial orientation positively affects innovation in the organisation, and greater automation adoption and integration into business processes will positively impact the company's performance.

The following section will discuss the theoretical frame and cand conceptual model adopted in this research study.

3. THEORETICAL BACKGROUND AND CONCEPTUAL MODEL

3.1. Introduction

This chapter will present the theoretical and conceptual model that will serve as the blueprint for the research study, which is the theory of constraint (TOC) framework and the TOE model. TOC identifies constraints that prevent the organisation from achieving its strategic objectives. Based on the TOE conceptual model, research questions will be formulated relating to the technological, organisation, and environmental contexts.

3.2. Theoretical background: Theory of Constraints (TOC)

The theoretical bases for the Theory of Constraints (TOC) were developed and promoted by DR Eliyahu Goldratt, a manufacturing expert in the 1980s. In his book, Goldratt (1990) maintains that the theory of constraints identifies constraints that prevent the organisation from achieving its strategic objectives. Goldratt (1990) further adds that organisations need to innovate and eliminate those constraints continuously and systematically until they ease those limiting factors.

Additionally, Mabin (1999) argues that each IT application has at least one restriction that limits its output. This theory maintains that the more complex the application is, the fewer autonomous process possibilities and, therefore, fewer constraints. Along the same lines, Şimşit et al. (2014) argue that TOC sees these complex processes as an interconnected chain and should not be allowed to disintegrate by any bottleneck.

Moreover, constraint theory provides a robust set of tools to help achieve an organisation's strategic objectives. According to Goldratt (1990), the basic steps to achieving these goals are to identify methods to detect and eliminate the so-called constraints, identify tools to analyse and solve problems and identify strategies to evaluate performance and guide management decisions.

Ramdani et al. (2020) highlight that the banking industry is highly regulated and dynamic, with high competition and little room for differentiation. Some of the issues relating to the constraints confronted by the banking industry in Southern Africa are centred around reliability, productivity, skilled labour, and reliability of IT applications and business processes.

The theory of constraints is suitable for entrepreneurial-oriented implementation of business process automation; this will help understand factors hindering the adoption of business process automation in the South African banking sector. TOC is a systematic approach that identifies and removes limitations that impedes the adoption of automation in business processes. Some of the constraints identified include a lack of financial resources, skills, maturity stage of the organisation, lack of IT infrastructure, and unwillingness to change (Balasingham, 2016).

According to Du Plessis (2017), benefits organisations can realise by strategically integrating automation into their business processes include higher productivity, lower operating costs, increased flexibility, increased efficiency, improved quality of output, and increased sustainable competitive advantage.

Based on the information above, we can conclude that the constraint theory best explains factors that impede the adoption and integration of business process automation in the South African banking sector.

3.2. Initial conceptual model

Miles et al. (2014) define a conceptual framework as the blueprint that guides the research phenomenon and can be presented graphically or narratively. This research study aims to understand factors that impede the adoption and integration of automation into business processes in the South African banking sector. Therefore, to understand and ensure innovation growth in the South African banking sector through business process automation.

Moreover, the TOE framework consists of the famous Delusion of Innovation (DOI) theory, in which Rogers (1995) emphasises the internal and external

characteristics of the organisation as driver's innovativeness. In addition, the TOE framework supports Rogers' DOI theory, better explaining intra-firm innovation diffusion (Hsuet et al., 2006). Furthermore, the TOE has been employed by multiple authors to understand and explain different innovation adoption in organisations. Table 1 below presents five authors that have adopted the TOE framework in their studies on embracing innovation.

Table 1: Application of the TOE Model for different technological adoption

Authors	***Application of the model***
Lee et al. (2009)	Knowledge management systems (KMS) adoption
Kuan and Chau (2001)	Adoption of electronic data interchange (EDI) open systems
Pan and Jang (2008)	Enterprise resource planning (ERP) adoption
Oliveira and Martins (2008)	The adoption of websites.
Liu 2008, *Martins and Oliveira (2009)*	Adoption of e-commerce

This research study will adopt the Technology, Organisations, and Environment framework (TOE) established in 1990 by Tornatzky and Fleischer (1990). The TOE framework identifies the aspects of an organisation's context that influence the adoption and integration of technological innovation. These include the (i) technological context, which describes the internal and external technologies relevant to the organisation's adoption, (ii) organisations context, which refers to the descriptive measures relating to the scope, size, and organisational structure; and lastly, (iii) environmental context which refers to the operating environment of the organisation such as industry, competitors, and regulations. The environmental context addresses both opportunities and constraints for technological innovation.

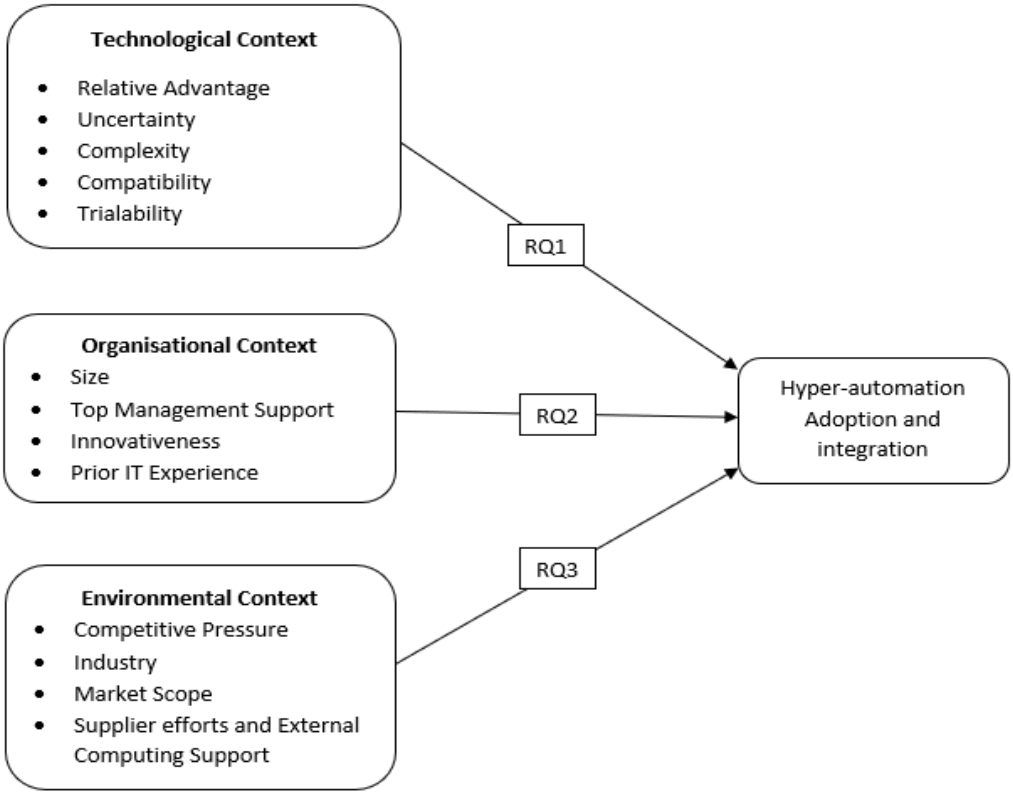

Figure 5: Conceptual model for the research study

Technological context: Refers to the technologies available to the organisation for adoption and utilisation in the expedition for the adoption and integration of automation; these include technologies that the organisation poses and those available in the market (Tornatzky et al., 2006). According to Roger (1995), perceived relative advantage, compatibility, complexity, and trialability (the extent to which automation can be piloted in the organisation) are essential factors that influence innovation adoption. Moreover, previous studies have shown that technological factors are key to technological adoption (Chong & Bauer, 2000; Jeyaraj et al., 2006; Iacovou et al., 1995).

Organisational context: These are the factors that are internal to the organisations that influence the adoption of innovation in the organisation. Iacovou et al. (1995); Jeyaraj et al. (2006) emphasise that the size of the organisation, its organisational structure, and management support are the main factors that influence the adoption of innovation in the organisation. Moreover, some of the factors that influence innovation in the organisation include support from top

management (Jeyaraj et al., 2006; Sabherwal et al., 2006). And overall readiness in the organisational (Iacovou et al., 1995).

Environmental context: Refers to the operating environment of the organisation, such as industry, competitors, and regulations. The environmental context addresses opportunities and constraints for technological innovation (Scupola, 2005). Significant literature has shown that environmental factors influence the adoption and integration of automation, including (i) competitive pressures (Dholakia and Kshetri, 2004; Zhu et al., 2003). (ii) Pressure from stakeholders such as customers, suppliers, and competition in the industry (Iacovou et al., 1995; Grandon and Pearson, 2003) (iii) External technological infrastructure such as reliable electricity and network coverage (Scupola, 2003). Lastly, the role played by the government (Kuan and Chau, 2001; Scupola, 2005).

From figure 5 above, the following research questions (RQs) relating to adopting BPA in the South African investment bank were formulated.

- **RQ1**: How does technological context affect the adoption of automation in business processes?
- **RQ2**: How does organisational context affect the adoption of automation in business processes?
- **RQ3**: How does the organisation's environmental context affect the adoption of automation in business processes?

Overall, Miller (2011) maintains that for any change and innovation to occur, the organisation needs to align its culture with the new change they want to implement. Culture is the organisation's key competitive advantage because it is unique and cannot be replicated. Organisations that want to adopt BPA must curate a culture that embraces change and encourages innovation.

3.3. Conclusion

This chapter has provided the theoretical and conceptual model that will serve as the blueprint for the research study, which is the theory of constraint (TOC) framework and the TOE model. TOC identifies constraints that prevent the

organisation from achieving its strategic objectives. Based on the TOE conceptual model, research questions were formulated relating to the technological, organisation, and environmental contexts. A good theory helps to predict what will happen given a set of values for specific variables and to help understand why the outcome is the way it is. Although the initial objective between the theorist and practitioner may differ, a good theoretical model will offer great value to both.

The following chapter will provide a detailed discussion of the methodology adopted in this research study.

4. METHODOLOGY

4.1. Introduction

This chapter will discuss the research methodology employed in this research study and the chapter will discuss the research design, philosophical orientation, and sampling method. Furthermore, this chapter will discuss the data collection and analysis methods employed in this research study.

4.2. Research design

The research study has adopted the systematic research design by Mouton (2021) to help structure and provide direction for the research study. Mouton (2021) maintains that a research design is a blueprint providing the layout for the research study. Figure 6 below provides five steps the researcher has conducted during this study. These steps include identifying and discussing the research area and objectives, conducting a theory and literature review, designing the research methodology, collecting, and analysing the research data, and drawing conclusions and recommendations.

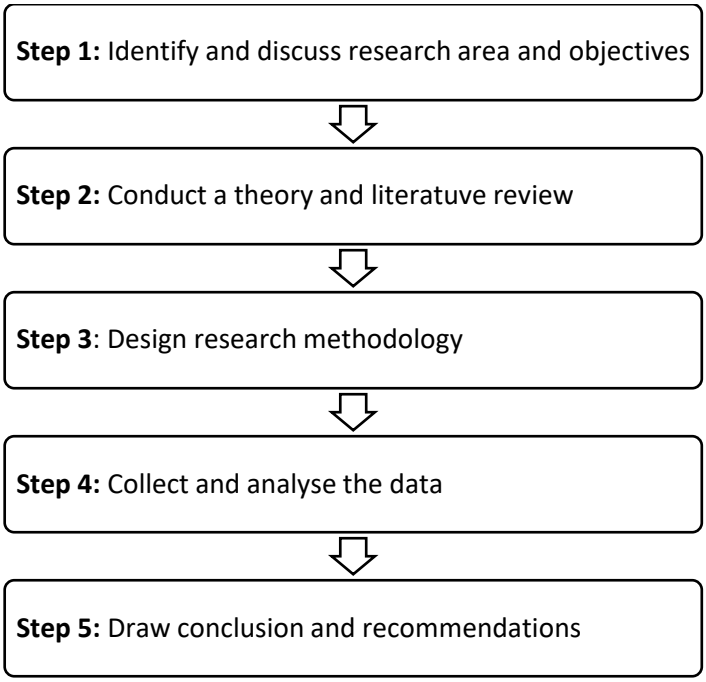

Figure 6: Systematic Research Design, Adapted from (Mouton, 2001)

The following section will provide a detailed overview of what each of the steps depicted in figure 6 above entails.

Step 1: Identify and discuss the research area and objectives

Identify gaps in the research phenomenon that can be understood and solved by conducting the research (Mouton, 2021). This study is concerned with understanding factors impeding a South African bank's adoption and integration of automation in business processes.

Step 2: Conduct a thorough literature review

Conduct a detailed theory and literature review relating to the research phenomenon. Prior literature will allow the researcher to understand the work already done in academia and the market. Oates (2006) further adds that the literature review should be recent, relevant, and credible. Moreover, identify the appropriate theoretical framework and conceptual model that will serve as the blueprint of the research study.

Step 3: Design research methodology

This step will discuss the research orientation, data collection, and analysis applied in the study. The research will employ an interpretive orientation to help explore

the factors that hinder the adoption and integration of automation in business processes for South African banks.

Step 4: Collect and analyse the research data

Research data will be collected using a qualitative method through semi-structured open-ended interviews and analysed using the thematic analysis method by Braun and Clarke (2006). Although the qualitative approach can be time-consuming, it offers detailed information and insights concerning the study phenomenon that cannot be achieved by the quantitative method (Oates, 2006).

Step 5: Draw a conclusion and recommendation

Finally, the concluding chapter of the research study will summarise the content of the research study concerning the literature. Lastly, provide management recommendations drawn from the analysis concerning the literature review.

4.3. Philosophical orientation - Interpretivism

Interpretivism philosophical orientation has been adopted to comprehend the underlying philosophical stance. This section will discuss the interpretivism orientation in its two viewpoints. **Ontological**, the underlying assumption about the phenomenon studied. **Epistemological**, valid knowledge obtained about the phenomenon under study. These philosophical stances will help the researcher understand how social reality can be observed, measured, and understood about factors impeding South African investment from adopting BPA (Orlikowski & Baroudi, 1991).

The interpretivism philosophical orientation aims to develop an understanding of an individual's dynamic social life and how individuals construct meaning out of different contexts in their lives. Oliver (2009) further adds that interpretive orientation achieves this by understanding the dynamic nature of the individual's personal view, environment, relationships, and social life. Similarly, Walsham (1995, p.76) maintains that social life is grounded on socially constructed systems, individuals' social interaction, and the internal reality of individuals.

Moreover, an interpretive method is used more in qualitative research that focuses on ‘what’ and ‘why’ things exist, as opposed to quantitative research that often uses a positivistic orientation that focuses on ‘how many’ things exist and the nature of their relationship (Polkinghorne, 1991, p.112).

Research participants pose distinct realities about the impediments to adopting BPA in the bank. Hence, the ontological and epistemological assumptions are relevant to this study. Furthermore, the epistemological stance assumes different outcomes result from different times, contexts, and environments. There is no universally accepted truth.

There is no philosophical orientation without criticism; a philosophical orientation is selected based on the type of research conducted. Just like in this instance, the researcher believes the interpretivism orientation is best suited considering the nature of the research study. Some researchers criticising the interpretivism paradigm include Nandhkumar (1997, p.76), who believes that the interpretive orientation does not consider external factors.

Orlikowski and Baroudi (1991, p.6) maintain that interpretivism orientation does not take greater consideration into structural conflicts within organisations and societies. Lastly, Jones and Nandhkumar (1997, p.77) argue that identifying useful information when interacting with the subject is often difficult. In some instances, the researcher can misinterpret the participant, thus altering the outcome of the research.

Table 2 below summarises the interpretivism orientation discussed above concerning its ontological and epistemological assumptions.

Table 2: Summary: Interpretivism (ontological and epistemological assumptions)

Ontological assumptions	Epistemological assumptions
There is more than one perspective to one incident.	Knowledge regarding the phenomenon is gained through an individual's experience.

Individuals interpret and make their meaning of events based on their experiences.	Knowledge is gained in an inductive way to create theory.
Reality is directly constructed from an individual's interpretation, and it is subjective.	Knowledge is gained through a strategic process that respects people and objects' differences.
Events are distinctive and cannot be generalised.	Knowledge arises from district situations and is not reducible to simplistic interpretation.

To understand social reality, it is empirical to understand how meanings and practices are formed and informed by norms and languages shared by different people towards a common goal (Jones and Nandhakumar, 1997; Orlikowski and Baroudi, 1991). The ontological stance emphasises that the study cannot be separated from the researcher; the researcher forms a critical part of the study.

Moreover, the knowledge of reality and reality itself are social products incapable of being studied and understood independently by the social actors, including the researcher who makes sense of reality and constructs it (Jones and Nandhakumar, 1997; Orlikowski and Baroudi, 1991).

4.4. Sampling method

This section will discuss the sampling method employed in the study and how study participants were selected. A purposive sampling method was selected for this qualitative study. The purposive sampling method is a non-probability method that relies on the judgment of the researcher to select the research participants, unlike other methods such as the 'convenience method' where the sample is drawn from a source that is most convenient and accessible to the researcher which increases the bias of the results (Patton, 2002).

This method was selected because it focuses on individuals and places better positioned to assist the researcher in understanding the phenomenon of interest (Creswell 2012). In addition to the purposive sampling method selected, the research will utilise the snowball sampling method to increase the study sample

and reduce the researchers' biases. Creswell (2012) maintains that the snowball method allows selected participants to refer other participants to partake in the research study, thus snowballing the sample.

Literature highlights that non-probability sampling methods have an increased risk of bias elements attached to them. As a result, below are some of the biases the researcher should consider when selecting a sample, (i) low response rate from the selected sample, (ii) outdated sample list, (iii) people in "hard-to-reach" groups are omitted and (iv) switching the sample in the middle of the research study should all be avoided.

3.4.1. Targeted population

Dube and Pare (2003) define the target population as the total number of participants that partake in a research study, the individuals the researcher selects and isolates from the population to be part of the research study and draw insights. The target population for this research study will be Information Technology (IT) managers and professionals responsible for the strategy, operation, maintenance, and upgrade of a critical business process within the bank or business division.

3.4.2. Sampling population and sampling size

Literature maintains that sampling size is one of the critical aspects of any research study because it significantly affects the data collection and outcome of the research study (Oates, 2006). Moreover, researchers such as (Fugard and Potts, 2015; Clarke and Braun, 2013) say twelve participants are enough for a qualitative research study to reach data saturation. Data saturation is a point in the data collection stage where no new information is discovered from the interviews. In that light, twelve participants were interviewed. However, if needed, the researcher will allow reservations for more data collection or follow-up interviews.

Over and above, Yin (1992) further maintains that the more participants there are in a research study, there more accurate the outcome, and contrary, the more time and resources intensive the study will be. Moreover, to collect relevant and

insightful information to help answer research questions posed in chapter 1, the researcher aims to conduct interviews until saturation. However, the initial sample size is 12 participants.

Table 3 below lists the participants interviewed for this study, their roles, and their description. To protect the identity of the participants, pseudo names will be used instead of their real names.

Table 3: Research participants and role description

Role	Role Description
Head: COE (Centre of Excellence) Number of participants: 1	Responsible for new automation projects and maintenance in the organisation. The duties cover all business functions.
Senior Solutions Architect Number of participants: 4	Interfaces with the business and technology teams to find securely scalable solutions.
IT Platform Lead Number of participants: 2	Senior manager profession responsible for daily operations of the platforms supporting the users of the technology solutions.
Senior Specialist: Process Automation Number of participants: 2	Technical expert responsible for the analysis and solutions development of solutions. These professionals specialise in robotics process automation (RPA) tools.
Data Architect Number of participants: 1	IT professional responsible for defining policies, procedures, models, and technologies used in collecting, organising, storing, and accessing information.
IT Team Leader Number of participants: 2	Responsible for daily operations for single or multiple IT systems. Also responsible for managing IT staff, system maintenance, and SLA.

Total number of participants = 12

4.5. Pilot Testing

A pilot test was conducted to ensure the prepared questions were easy to understand and would provide insights required to address the research questions. Pilot testing was conducted with participants who fit the research study's target population and were subject matter experts in their fields (Oates, 2006).

4.6. Data collection process

A qualitative data collection method has been employed to gather information and insights through semi-structured open-ended interviews with IT managers and professionals in the bank. The researcher has selected interviews over other data collection methods due to the numerous advantages the interviews offer. For instance, Oates (2006) maintains that due to the nature of interviews, the researcher can accumulate critical information relating to the research phenomenon from participants. Moreover, interviews allow the researcher to understand in-depth the factors hindering the adoption of and integration of automation technologies in business processes in the banking sectors.

These semi-structured open-ended interviews will be conducted virtually and recorded for transcription. Additionally, the researcher aims to leverage one of the main advantages of the qualitative research method: the ability to ask open-ended questions, which usually yield rich and more comprehensive content (Oates, 2006).

4.7. Data analysis approach

A thematic data analysis method was adopted to analyse the collected data and draw insights from the research participants. Authors such as Braun and Clarke (2006) describe thematic data analysis as the method which searches across the data set to identify, analyse, and report patterns and themes in the data set. A narrative presentation will be adopted due to the nature of the research study. The narrative presentation is useful when formulating stories presented by research participants while considering the context of each case and participants' different experiences.

Thematic data analysis also helps with the interpretation of the data set in the process of selecting codes and construction themes. Clarke and Braun (2013) provide six steps for conducting thematic data analysis.

1. The researcher should familiarise themselves with the dataset
2. Generate initial codes
3. Search for themes, patterns, and relationships in the data
4. Review themes
5. Define and categorise themes
6. Write analysis report to draw insights

Moreover, thematic data analysis was selected due to its ability to conveniently summarise key features of a large body of data and offer a thick description of the data set. The thematic analysis method is easy and quick to learn, which makes it a great choice for beginners. Secondly, the method is accessible to researchers with little or no experience and can highlight similarities and differences across the dataset (Oates, 2006). A thematic data analysis allows the researcher to state the main topics or ideas around an interview or focus group transcript. Additionally, a narrative analysis, on the other hand, might enable us to glean insights into how and even why topics or ideas are being presented.

4.8. Validity and Reliability

Any research study needs to ensure its results and valid and reliable. Validity refers to the credibility of the research insights and conclusions, while reliability refers to the extent the data collection methods were applied. Moreover, a triangulation method was adopted to ensure the validity and reliability of the research study. Archival data and pilot interviews were conducted in the process. Moreover, academic software was used for data abstraction to eliminate bias and ensure anonymity.

4.9. Ethics and Confidentiality

According to Oates (2006), ethics in research can be defined as the moral principles that govern how the research study is conducted. Ethics in a research

study are essential, mainly when the study involves human participants, such as in interviews. Three forms were to be signed before the research study could take place.

1. Informed consent from the organisation allowing the researcher to contact research participants regarding the study will be required. Attached on APPENDIX C.
2. Informed consent from each research participant ensures an understanding of their role and rights in the research study. Attached on APPENDIX B.
3. Ethical clearance from the Wits Business School (WBS) will be required to ensure the study complies with the University's ethics relating to a qualitative study. Attached on APPENDIX D.

4.10. Conclusion

This chapter has discussed the research methodology followed during the research study. The theoretical framework selected is the Theory of Constraints (TOC) which helps identify constraints that prevent the organisation from achieving its strategic objectives. The research strategy selected for the study will be the qualitative strategy in semi-structured open-ended interviews with IT managers in the South African banking sector.

Moreover, interpretivism philosophical orientation was discussed and demonstrated concerning the research study. Moreover, a thematic data analysis method will be adopted to help with the analysis and interpretation of the data set. Lastly, research ethics and their importance have been discussed. The research study will require three signed consent agreements from three parties, WBS, the banking institutions, and the research participants.

The following section will discuss the data collected from research participants using a thematic data analysis method discussed in chapter 4 above.

5. ANALYSIS AND INTERPRETATION OF FINDINGS

5.1. Introduction

The following chapter will present the results and analysis of the data collected from interviews with IT leaders and professionals in a South African investment banking context. A fishbone diagram will be employed to anchor the presentation of the results using the quotes and themes attained from the thematic analysis where impediments to BPA were identified. Moreover, the Technology, Organisation, and Environmental (TOE) model will categorise these impediments.

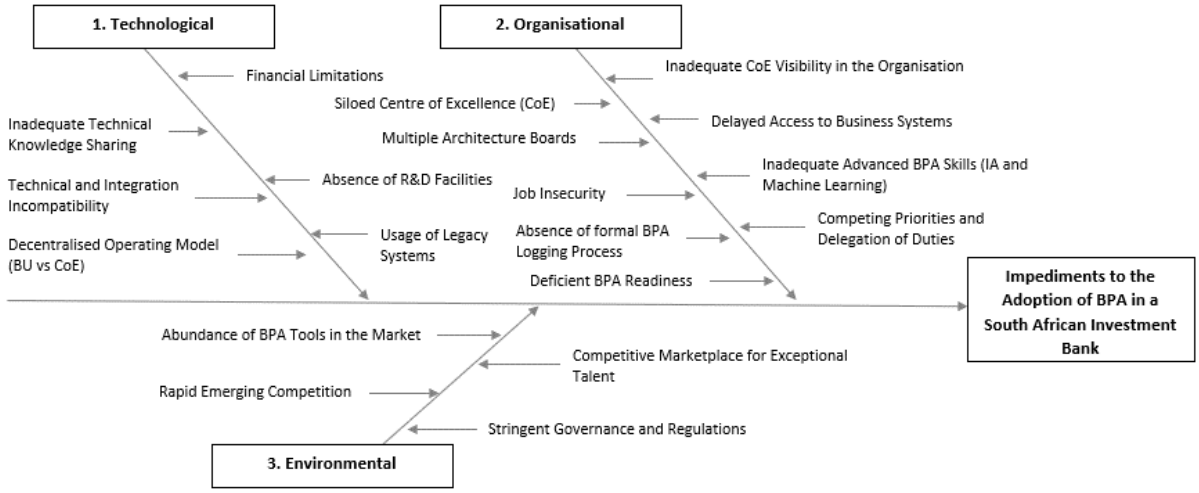

Figure 7: Fishbone: Identifying the impediments to the adoption of BPA in a South African investment bank

The fishbone diagram above depicts the analysis of factors that impede the adoption of BPA in a South African investment bank. These factors are categorised into three categories using a thematic data analysis approach. The initial impediment uncovered concerns technology that is available in the organisation. These challenges include legacy systems, technological incompatibility, financial constraints, code maintenance, and difficulty translating business requirements into technical requirements, which can then be implemented.

Secondly, organisational impediments exist within the organisation. These are factors that the organisation has control over, including job insecurity, lack of advanced automation skills, the decentralised centre of excellence (CoE), and extended approval period for new tools and technology in the organisation.

Lastly, environmental impediments include factors that exist outside the organisations but affect the organisation's innovation adoption; these impediments include overflooding of automation tools and technologies in the market, competing priorities, a competitive marketplace for exceptional talent, and stringent governance.

The first impediment that will be discussed concerns technological impediments that affect the adoption of business process automation in a South African bank.

5.2. Research question 1: Technological Impediments

How does technological context affect the adoption of automation in business processes?

This research question sought to understand technological factors impeding the adoption of business process automation in the bank. The question was directed to IT leaders and professionals. Technological impediments refer to technologies available to the organisation for adoption and utilisation in the expedition to adopt business process automation, including technologies the organisation poses and those available in the market.

5.2.1. Technical and Integration Incompatibility

According to research participants (10 out of 12), one of the highest impediments to business process automation in the bank is the technological incompatibility of current systems and new automation tools. Technological incompatibility refers to how automation tools function or integrate with existing technology to automate business processes. Research participants indicated compatibility challenges with the technology adopted for automation and IT systems utilised in the bank, which hinders the adoption of business process automation. Participant 1, who is a solutions architect, mentions that:

> *"Some systems and platforms have a security feature to prevent outside interference, but yeah, so I'm saying that it's not always straightforward to automate some systems. But for some, it's an easy plug and plays."*

Participant 2, who is the head of COE, is in alignment with the above participants and further adds that:

> *"You will always be constrained with the available technology, even if you've got the best."*

Other participants shed some light on a different perspective explaining why technological incompatibilities exist. One of the reasons is that there are thousands of business process automation tools in the market and hundreds of IT systems in the organisation, not all systems and tools will be compatible. Participant 1, who is a senior RPA automation specialist, adds that:

> *"Sometimes the robotics software is incompatible with other software or IT systems. The bank cannot accommodate all tools available in the market if the tool is only used for one or two systems and for a task that would save minimal person-hours a month, for example."*

To intensify the point raised above, participant 2, who is an IT team leader, adds:

> *"For example, if the software in the background runs on a Linux or Citrix environment, robotic software that we have will struggle to operate on that environment."*

5.2.2. Financial Limitations

Business process automation comes with high costs, which comprise software licensing, staff training, software installation and configurations, and routine maintenance costs, to name a few. According to the participants, these incurred costs sometimes do not justify attaining some business process automation tools considering the cost-benefit analysis.

Participant 6, who is the head technical architect and responsible for the approval of new technologies in the organisation, argues that for a new tool to be approved in the

bank, a sound business case needs to be presented and approved by various boards in the group, not just the bank. The business case needs to detail the cost-benefits analysis of attaining that tool. Participant 6:

> *"There are various things that we consider when assessing the application request for a new tool or technology; for example, will the bank be able to afford that software? Do they have the appetite to buy that software, so there's always a financial resource constraint alongside the benefits."*

Participant 8, who is a business analyst, further added:

> *"When we are trying to implement machine learning, the cost of the application is more than the benefits we will get."*

5.2.3. Usage of Legacy Systems

The bank heavily relies on legacy systems which are difficult and risky to modify and modernise. Replacing legacy systems can cause defects and introduce vulnerabilities to the entire bank. It is a consensus between participant 2, the head of CoE and participant 4, who is a Platform Lead, that maintaining these legacy systems is a nuisance due to the ancient architecture and technology they use.

Due to the organisation's strategic objective to implement 'platform technology' operated in the cloud and potentially integrate most of the bank's processes into one platform, it is not in the banks' interest to automate these outgoing systems. Participant 4, who is a platform leader for one of the critical legacy systems in the banks, adds that:

> *"It's all changing because the model has changed the platform. We are moving onto platforms, the bank's strategic objective, by 2025. So, I don't know which tools are available for CoE because automation is not the objective on my platform right now."*

Participant 4 further adds that:

"…and yes, I can produce several viable business cases, but for now, I'm trying to scale down."

There are tight financial budget constraints on legacy systems because the strategic objective of those systems is only to maintain them until they are faced out and replaced by modern and advanced systems. Therefore, these budget constraints on legacy systems are impeding the adoption of business process automation in the bank. Participant 2 adds that:

"I don't have much budget because this is a legacy platform. So, we can barely automate unless we do it ourselves."

5.2.4. Decentralised Operating Model (BU and CoE)

It has been understood from the research participants that the Centre of Excellence (CoE), which is responsible for the strategy and implementation of business process automation in the bank, is a standalone entity. It was a consensus that the CoE possesses business process automation knowledge and skills but limited business and IT system knowledge. Therefore, it is often a challenge for the team to translate business requirements into technical requirements for implementation. This challenge often hinders the automation processes because business requirements can be incorrectly interpreted, thus causing confusion between the business, IT, and COE teams. Participant 12, who is a senior RPA automation engineer, adds that:

"For that project, we implemented what we expected to implement, and we got it running. Anything else, we didn't worry about it, and sometimes the client blames our team for that, although those are the requirements we have received."

Participant 2, who is the head of CoE, expressed their frustration and added:

"Who will give you use cases, and people will give you different use cases? You might not even understand some of the use cases they give you."

Participant 9, who is a solutions architect, elaborated further on this impediment and added:

> *"You know, I would say it's decentralised regarding the delivery function. So, you've got a central team that works with RPA, and it takes time to unpack the requirements for those teams. So, we're looking at unpacking those requirements for the technical teams, making it easier to understand them. Firstly, I think technically, they've got the skills. But you know just that requirements phase for me has always been problematic."*

5.2.5. Inadequate Technical Knowledge Sharing (Code Maintenance)

Another technological impediment raised during the interviews concerns the difficulty of maintaining the code and tools due to the lack of knowledge sharing in the organisation. Another participant highlighted gaps where individuals are not deliberate or are reluctant to share knowledge on solutions they have designed or built. That often hinders the adoption of technological innovation. Because when those individuals leave the team, it might be difficult to maintain the solution due to the lack of knowledge sharing or documentation. Some participants have experienced this to the point they had to design a new solution. Participant 7, who is a senior automation specialist, recalls one of the instances they have experienced and mentions that:

> *"Because one of the problems we have most of the time is someone builds something in this tool that no one else uses or understands. And then once they leave the bank, you know, it becomes like a maintenance and support nightmare to those remaining."*

Participant 10, who is a Lead technical architect in the engineering team, explains why all the tools and technologies used in the bank must go through the architecture board, and the reason is mainly to minimise the knowledge-sharing gap in the bank. *Participant 4:*

"OK. So that's one of the reasons. Like, uh, everything must go through the architecture board to ensure that we don't duplicate work and that the tool is also compliant."

In alignment with the point above, participant 4 further elaborates:

"There are thousands of automation tools in the market. Suppose we let everyone choose the automation tools they use. In that case, we will have a problem as there will be a crazy number of tools to maintain. This can often result in a key man dependency issue compromising business continuity which we do not want."

5.1.6. Lack of R&D Facilities

Two participants expressed their thoughts regarding another technological impediment to adopting business process automation in the bank. It was mentioned that the organisation does not provide research and development facilities where employees can extensively explore new tools and technologies. This includes technologies that can be used for business process automation, which can then be presented to the architecture board for use and approval should they satisfy the use case with a justifiable cost-benefit analysis. Participant 8, who is a data architect, mentions that:

"Given that we do not have an environment where we can explore on our own, on tools that we want to try out and run different use cases because you can't do it on your laptop. Your laptop is part of the bank's network, so you cannot install any application. Yeah. So, I think that's one limitation for innovation, especially from a technology point of view."

5.3. Research Question 2: Organisational Impediments

How does organisational context affect the adoption of automation in business processes?

This research question sought to understand organisational factors impeding the adoption of business process automation in the bank. Organisational impediments are the factors internal to the organisation, and these factors influence the adoption of innovation in the organisation.

5.3.1. Siloed Centre of Excellence (CoE)

Centre of Excellence, also known as the CoE, is a team tasked with strategizing, implementing, and maintaining business process automation solutions and tools for the bank. The team comprises various skill sets, which include business analysts, process engineers, automation specialists, and test analysts, to name a few. According to most participants, the CoE team is a standalone team with a separate mandate. Feedback maintains that although the CoE team has extensive automation skillsets, they still lack the intimate business acumen and IT system knowledge which often impedes the adoption of process automation in the bank. Participant 7, who is a solutions architect, elaborates on this finding and mentions that:

> *"I would say it's siloed in terms of the delivery function. So, you've got a central team that works with RPA, and it takes time, you know, to unpack the requirements to those teams."*

Other research participants add that the CoE being further from business extends the period it takes to automate business processes due to the hoops and extended communication chain they must go through, in addition to the CoE having their prioritisation. Participant 2, who is a Technical Architect, adds that:

> *"The automation team is siloed. It's based in the centre of excellence business unit, which is a standalone now."*

Participant 12, who is an IT Team Leader, adds:

> *"That's almost too high because of the different systems, tech, and businesses. It is impossible to be an expert in everything."*

The interviews have further highlighted that it is often difficult to understand the type of skillset and capabilities within the CoE because of the low visibility of the CoE team. Participant 8, who is an architecture further adds that:

> *"When these guys present the stuff they're going to work on, no champion says no, but how do we automate in this thing? I know we prioritise that. We're going to integrate with murex, but how is that integration going to be automated? There's nothing that says look at JIRA."*

5.3.2. Deficient BPA Readiness

The data disclosed that the strong focus on business process automation was introduced late in the bank, with the introduction of the CoE team in 2017, formerly mandated to focus solely on designing, maintaining, and optimising business processes in the bank. But recently, in 2017, the CoE added the function of automation, which seemed like a logical progression for the team. The late introduction of business process automation has caused a delay for the bank to automate its business processes fully. As a newly integrated team, the team had to start from scratch, beginning with building the team, positioning themselves in the organisation, identifying areas that require automation, purchasing the correct automation tools, etc. Participant 4, who is the head of CoE, mentions that:

> *"So, now we are not doing anything on the AI or machine learning? Purely because we are still building the skills in the team, and we are having difficulty identifying the right business case, and these types of technologies come in at quite a cost."*

5.3.3. Multiple Architecture Boards (Delay in Approving New Technologies and Solutions)

New automation technologies and solutions take time to be approved in the bank, mainly due to the lengthy approval process and the due diligence required for approvals. A senior architect who sits on various approval boards responsible for approving new technology and tools in the bank mentions three boards that need to be considered, the subsidiary architectural board, the group architectural board, and

the technical architectural board. Data collection reveals that approvals can take 4 to 6 months, depending on the tool or solution. The senior architect mentions that:

> *"You must come to my board, and there's a very formal template that you must fill out. You and I would engage two or three times before you even presented at the C&I Technical Architecture Board with this very formal template you filled out. And we will scrutinise your solution according to what you filled out on that template.*

Other participants added that the approval process prolongs because it depends on multiple factors. These include factors such as analysis to determine if a similar tool can meet the expectations, the governance around the tools or solution, the security analysis of the tool or solutions, and the cost-benefit analysis for the proposed tool or solutions, among others. Participant 9, who is a member of the approval board, adds that:

> *"Synergies and using the same technologies to build an automated process across the organisation. It's not just something that you can, you know, quickly conjure up and go, and do you need to think deep and hard about something like this and make sure that it scales across the organisation."*

Another participant provides a timeline for the approval of new tools and solutions:

> *"Uh and taking preparing presentation and taking to different outwards. I think that process might take plus or minus three months. It never takes longer than, I would say, 45 days to go through; it needs to cycle through all the boards if need be. If need be, not if you must cycle through all the boards; it will not take you more than 45 days if you only must cycle through two or three boards and the pending again, depending on what you're doing.*

5.3.4. Job insecurity

Another critical point that multiple participants noted is the people aspect that should be considered in adopting any innovation. Participants highlighted that the business

process automation solution could eliminate an individual from the entire process or a team of people. It has been noted from the interviews that some individuals may be reluctant to create business cases for some of the processes that can be easily automated, as those processes might form a critical part of their performance review. Moreover, automating those business processes might eliminate an important part of their job, thus jeopardising their job. A participant who is an RPA automation specialist has experienced this in their role and shares their experience:

> *"That sometimes someone might feel like you know you're making their job redundant. For example, implementing a robotics process that can reduce significant men hours, you know, is also a challenge. So, I might not tell you that I do these mundane things as part of my job because you are taking my job away from me."*

A participant who is a Platform Lead further adds that:

> *"You know, how do you balance the truth? Because. This code can read market data faster than a trader can, and you can make decisions faster. You can go into the market, place orders, hedge, and do all sorts of things. It's going to be more efficient than the human."*

A participant who is a business analyst highlighted how the lack of business process automation could potentially disrupt the organisation if the organisation relies on manual processes:

> *"Uh, because everyone knows the pain of not having things automated because people go and leave, then things and processes break because someone is not here, you know, simple things like that."*

5.3.5. Inadequate Advanced BPA Skills (IA and Machine Learning)

It has been mentioned that the organisation is still in the infancy of its business process automation journey. Moreover, the CoE team has not developed advanced automation skills, which include artificial intelligence (AI), machine learning (ML), and hyper-

automation skillsets for business process automation. A consensus among participants is that the team implements basic automation solutions using robotic process automation (RPA) technologies such as Blue Prism and power automate, which are mainly reactive and apply to application systems automation. A participant who is a solutions architect and has worked on multiple automation projects mentions that:

> *"An integrity interrogating the data with proper AI, I think there's still a big gap in getting them onboarded within the business. We are not doing anything on the AI or machine learning front. Because we are having difficulty identifying the right business case, these technologies come at quite a cost. We can't bring it in to bring it in, so identifying the right business case is proving difficult."*

A participant who is the Head of the CoE adds that:

> *"We've even looked at data bot which sits in, I think, the parent company has a license, but again, you know, just identifying the use cases and defining the business case to leverage. These types of Technologies are something we are currently exploring. It's an ongoing process, and I think once we can identify that business case, we'll build out the skills.*"

5.3.6. Inadequate CoE Visibility in the Organisation

It was a consensus among some participants, such as a business analyst, solutions architect, and IT team leader, that there is a lack of visibility on the presence, functions, and mandate of the CoE entity, which is a team responsible for business process optimisation and automation in the organisation. Due to that reason, participants believe that the CoE is not being utilised to its maximum capability. The IT team leader, who has only been with the organisation for one year, went as far as mentioning they were unaware of the existence of the CoE dedicated to business process automation in the organisation and how to get a hold of them. And further adds that:

“I didn’t hear about this CoE until recently in one of the forums, so I do not know the type of work they have done or the function's mandate. I must follow up on that and see how they help my team.”

Contrary, the point highlighted above has been trumped by some of the participants that are aware of the functions of the CoE and have utilised their services. This raises further questions on whether the CoE function has positioned itself appropriately and is advertising itself in the organisation. A participant who is the head of CoE added that:

“Yeah, and I mean, we've had a lot of above-the-line communication. I mean, everything from frequent emails the EXCO sends. I think people who are unaware maybe need to pay more attention to their surroundings; I don't know. But yeah, you know what? I think people get so busy as well. That they focus on what they need to do.”

5.3.7. Competing Priorities and Delegation of Duties

It has been highlighted that most IT and business experts focus on their primary job requirements and rarely go out of their way to look for new tools they can use to automate some of their processes. Participants believe this is one of the impediments affecting the adoption of business process automation. Moreover, IT system users have become content with how their IT systems or processes operate, thus mainly focused on maintaining the system and their primary job description. A participant who is an IT Platform Lead adds that:

“So now you would get into their pipeline. They might have other priorities you know might not have the capacity for your work. They can be telling you what delivers this in, you know, six months down the line. But maybe this is an urgent requirement. So those sorts of things where you're not engaging with an external team.”

The head of CoE adds that:

“Automating in line of business is taking time because you know you've got the IT prioritisation. They will always be prioritisation. So, then you know the time

to implement takes a long. So, it's normal if it's a project. It is much easier because you would involve the CoE team as a resource in that project. Uh, but for ad-hoc stuff is much more difficult because then you must go through the whole prioritisation."

5.3.8. Absence of Formal BPA Logging Process

It has been highlighted that there is currently no formal process for logging an automation request with the CoE team, and this causes confusion and impedes the automation process in the bank. The data highlighted that to log a request with the CoE team, one must send an email with requirements via email, and someone addresses it and get the request prioritised. A participant who is an IT manager contends the irony of the process and mandate of the CoE, which is mandated to automate business processes. A participant who is the head of technical architect and has extensive experience working with the CoE on new automation solutions maintains that:

"…there's no formal process on how the project's kick-off. To my mind, at least, but when the bank has a centre of excellence, you knock on their door, you pop an e-mail to their DL email or manager, and you say, listen, we've seen you been doing some work there, or you've been doing some good work there, and we would like to know if you can help us for instance..."

Another Participant who is an IT team lead expresses their thought on the absence of a formal logging process when teams or individuals want the CoE to automate their business processes:

"Again, there's no formal way of logging a process if you wanted to say, this is a terrible start. Your project will sort of organically be created rationally with assigned people to it. They will first do some business analysis to see if they are valuable. But say you check all those boxes, right? And you've struck gold in what you want to automate you. You will have the support, team, developers, and everybody to support you in that endeavour."

5.3.9. Delayed Access to Business Systems

Participants from the CoE team have highlighted that one of the main factors that delay automation progress is that some business areas or platforms delay providing them with access to the IT systems, which would allow them to perform their job of analysis and automation. Without system access, the CoE is not able to automate processes, and it causes an inconvenience to the team. The head of the CoE team further mentions that:

> *"The challenge we find is access to a line of business systems. This takes quite a long, and that's effectively what, you know, delays us quite a bit."*

The head of CoE further explains a mitigation solution to try and avoid the delayed access challenges above.

> *"And the way we have tried to overcome that is, we've put in a robotics champion that facilitates the access with business systems and an engagement for us with business units?"*

5.4. Research question 3: Environmental Impediments

How does the organisation's environmental context affect the adoption of automation in business processes?

This research question sought to understand how environmental factors influence the adoption of BPA in the investment bank. Environmental impediments refer to the organisation's operating environment, such as industry, competitors, and regulations. The environmental context addresses opportunities and constraints for technological innovation (Scupola, 2005).

5.4.1. Abundance of BPA Tools in the Market

The research data has highlighted the predicament the organisation faces when choosing the right automation tools due to overflooding of automation tools in the market. One participant highlighted that there isn't one solution that fits all, meaning they require multiple tools to automate processes in the bank. Those tools are being developed and updated at a rapid rate. In addition, participants believe that due to the

rate automation tools are advancing, it is difficult for organisations and individuals to keep up. A participant who is a data architect mentions that:

> *"I can tell you right now, as we speak, another automation tool is being developed, patched, or updated. Although we might want to add more solutions for our automation needs, we cannot maintain all of them. Hence, we rely on the technical architecture board to guide us on approved tools we can use. We are a bank and can't just use unproven tools, and we prioritise security over everything else because we deal with sensitive information."*

5.4.2. Rapid Emerging Competition

Participants have highlighted how much the banking landscape has evolved in recent years. Some recent innovations include platform strategies, blockchains, FinTechs, and hyper-automation, to name a few. These technological advancements elevated competing priorities for the bank's leadership. Now more than ever, Banks must stretch their limited resources to address completion from all these emerging technologies and competition. However, they often drown in the noise, delaying their overall innovation adoption.

> *"If you look at the market, the bank faces many new technologies and competition. For example, everyone wants that piece of the pie. Look at network providers that are trying to snatch customers. Look at MTN with their new service mobile money (MoMo), which is doing very well, and Vodacom with M-pesa. And there are also fintech or online banks such as Discovery bank, Tyme bank, and Bank zero. Banks have a lot of pressure to innovate more than ever. If this trend continues, where do you think traditional banks will be in 10 years?"*

5.4.3. Competitive Marketplace for Exceptional Talent

The research data highlights that the banking and finance sector is not the most engaging place to work for technology geeks. Participants have highlighted how the banking industry is losing exceptional talent due to the limited creative freedom they get in the banking industry. Somewhat technology is not considered a high priority in the bank, but security and stability, along with clients' satisfaction, cause

dissatisfaction among the talented, technologically inclined workers. The research data claims that these workers often migrate to innovative organisations and embrace risk-taking for innovation. One participant who was once a Java developer and now a solutions architect articulates the dilemma faced by banks which do not fully utilise their talent:

> *"You know, working for a bank as a developer isn't much you can do unless you get staffed on an exciting project. Mainly you will be maintaining legacy systems and configuring the shelf system. We have been losing lots of good talent because of that. Imagine you come from a place where you used to write code, but when you join the bank, you no longer get a chance to do that, and you will be bored. Developers always want to break and fix things, and you know problem-solving."*

5.3.4. Stringent Governance and Regulations

The South African banking industry is one of the highly regulated and monitored industries in South Africa, which limits the level of innovation, automation, and tools that banking services can use in South Africa. The height of regulation in the South African banking sector often results in red tape for organisations when introducing new technologies and innovation. This is due to the nature and sensitivity of the information, which is highly protected by laws such as the protection of personal information act (POPIA), which governs the collection, usage, and transfer of clients' personal information. A data architect participant argues that banks should be careful when introducing innovation and how they try to manage that.

> *"Everything must go through the architecture board just to make sure that we don't duplicate work and that the tool complies with the bank and industry policies which are quite particular."*

5.5. Conclusion

This chapter presented the analysis of the results gathered from the semi-structured interviews with IT leaders and professionals in the South African investment bank. Results were presented with guidance from the TOE model, which intended to understand the impediments of business process automation in terms of the bank's

technology, organisation, and operating environment. Study participants had experience with the bank's technology, business processes, and automation.

The data indicate that major impediments are around technology and organisational impediments. Participants raised concerns about technology and integration incompatibilities, legacy systems, lack of R&D facilities in the bank, and lack of technical knowledge sharing. Moreover, some organisational impediments raised include siloed CoE, job insecurity, lack of advanced automation skills, and lack of formal logging process.

The next chapter will present a detailed discussion of the abovementioned findings using thematic data analysis from the data gathered through semi-structured interviews with IT leaders and professionals.

6. DISCUSSION OF RESULTS

6.1. Introduction

This chapter provides a detailed discussion of the research study findings presented in the chapter above. This chapter will discuss the findings concerning the literature to better understand the impediment to adopting business process automation in the South African banking sector. Moreover, the discussion will build on the TOE model adopted in this study.

6.2. Research Question 1: Technological Impediments

How does technological context affect the adoption of automation in business processes?"

This research question sought to understand technological factors impeding the adoption of business process automation in the bank. Technological impediments refer to technologies that are available to the organisation for adoption and utilisation in the expedition for the adoption of business process automation, and these include technologies the organisation poses and those available in the market (Tornatzky & Fleischer, 1990; Chau & Tam, 1997; Jeyaraj et al., 2006).

According to Roger (1995), perceived relative advantage, compatibility, complexity, and trialability (the extent to which BPA can be piloted in the organisation) are the important factors influencing innovation adoption. Moreover, previous studies have shown that technological factors are key to organisational innovation (Chong & Bauer, 2000; Jeyaraj et al., 2006; Iacovou et al., 1995).

6.2.1. Technical and integration Incompatibility

Data analysis suggests that incompatible technologies are one of the main impediments to adopting business process automation in the banking sector. Technological incompatibility refers to how automation tools fail to function or integrate with existing technologies in the organisation. Literature shows that technology contributes to innovation adoption in organisations (Chong & Bauer, 2000; Jeyaraj et al., 2006; Iacovou et al., 1995).

The research study participants have indicated compatibility challenges with the technology adopted for automation and IT systems utilised in the bank, which hinders the adoption of business process automation. The data analysis maintains that the main reason for technological incompatibility in the bank is that there are thousands of business process automation tools in the market and hundreds of IT systems in the organisation. All technologies can't be compatible with one another. The banking industry is highly regulated in South Africa; therefore, utilised tools must comply with organisational and industry policies and governance.

6.2.2. Financial Limitations

BPA comes with high investment and operating costs, which comprise software licensing, staff training, software installation and configuration, and routine maintenance costs (Haleem et al., 2021). According to the analysis of results, at times, these incurred costs do not justify attaining some of the business process automation tools considering the cost-benefit of the tool.

Insights from the head architect, responsible for approving new technologies in the organisation, argue that for a new tool to be approved in the bank, various boards in the broader group need to present and approve a sound business case, not just the

bank. The business case needs to detail the cost-benefit analysis of attaining the tool; unfortunately, in some cases, the benefits do not outweigh the costs (Lafrate, 2019). For instance, a tool may be perfect for one business case, which would save the organisation only a fraction of men hours in a year, which is slightly beneficial considering the initial and maintenance costs incurred.

6.2.3. Usage of Legacy Systems

Literature shows that banks heavily rely on legacy systems which are challenging and risky to upgrade and modernise. Moreover, replacing legacy systems can cause defects and introduce vulnerabilities to the entire bank (Stulz, 2019). The data analysis revealed that upgrading legacy systems is a nuisance due to their ancient architecture and technology. Legacy systems are platforms that support the bank's core functions, processes, and back-end functions.

The analysis further demonstrates that due to the organisation's strategic objective to implement *platform technology* (technologies that aggregate the banks' core functions in one platform) and often operated in cloud infrastructure, therefore, it is not the bank's priority to invest and automate legacy system which will be phased out. This lack of investment in legacy systems, rightfully so, hinders the adoption of business process automation in the organisation. The constricted financial budget on legacy systems forces IT teams only to maintain the systems and apply minor improvements that do not require a lot of financial resources. Moreover, budget constraints on legacy systems are impeding the adoption of business process automation in the bank (Stulz, 2019).

6.2.4. Decentralised Operation Model (BU vs CoE)

The data analysis has highlighted that the Centre of Excellence (CoE), a team responsible for the strategy and implementation of business process optimisation, maintenance, and automation in the bank, is a standalone team. Although the team possesses business process automation knowledge and skills, it has limited business and IT system knowledge and skill. This shortfall of business and IT system skills often poses a challenge for the team when it's time to translate business requirements into technical requirements for implementation (Alberth & Mattern, 2017). Thus, it impedes

business process automation in the organisation, mainly because business requirements are often incorrectly interpreted, thus causing confusion between the business, IT, and CoE teams.

The literature argues that miscommunication is one of the factors affecting IT Teams globally in the systems development life cycle (SDLC) methodology. Different teams and requirements carrying out different tasks can often be taken out of context if not well-documented (Du Plessis, 2017). The diagram below shows the different stages of developing an automation solution using the widely adopted SDLC methodology.

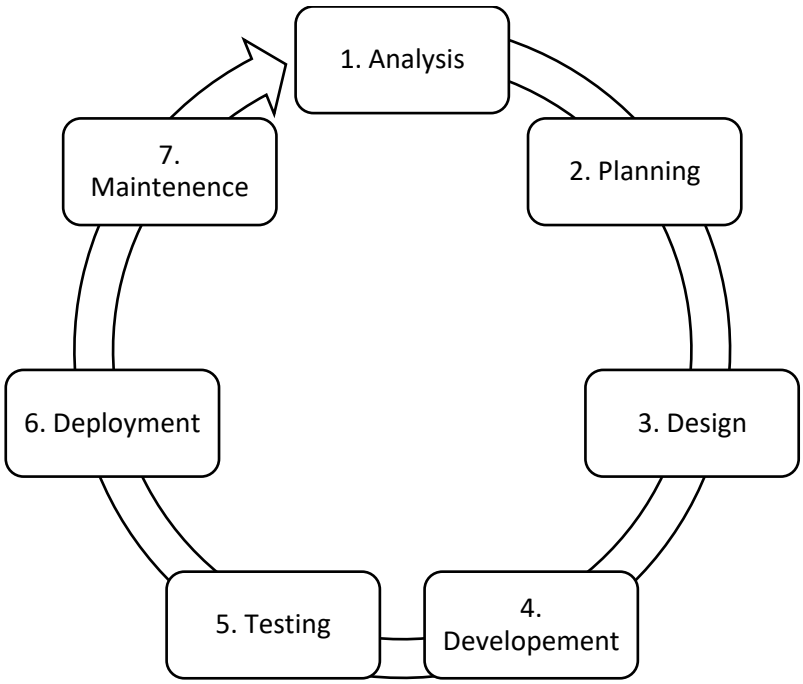

Figure 8: SDLC for Business Process Automation (BPA) in the organisation

The section below details the roles and who is responsible for these roles from a banking perspective. (1) **Analysis**: The initial stage involves subject matter aspects and all stakeholders to give the scope and objective of the project. This requires teams to get precise and detailed. (2) **Planning**: The second step is the feasibility analysis, where teams determine the project needs, timelines, governance, operation feasibility, and skills requirements. (3) **Design**: The CoE team designs the solution on a higher level. This will also include a detailed architect diagram along with technical details.

(4) **Development**: This is where the technical specialists develop the solution, usually the longest step in the SDLC methodology. (5) **Testing**: The CoE and IT systems testing teams test the developed solution. Unitary and integrated testing ensures the solution works according to customer requirements. (6) **Deployment**: Once the testing stage is successful and signed off by stakeholders, the solution is then integrated into the production systems (7) **Maintenance**: Once deployed, the solution is handed over to the IT support team for maintenance; this includes bug fixes, upgrades, and enhancements.

6.2.5. Inadequate Technical Knowledge Sharing

Lack of technical knowledge sharing in the organisation was highlighted as one of the impediments to business process automation. The data analysis indicates a lack of knowledge sharing (overlooked or deliberate), where individuals do not actively share knowledge within the organisation or document solutions they have implemented. As a result, this confuses when the solutions need to be maintained without the author. Moreover, the lack of detailed documentation can potentially cause duplication in solutions, which takes the team a step back in their automation journey.

Atlassian (2022) maintains that documentation is a single source of truth, saving the team time and energy. This finding does not come as a surprise; the biggest documentation software, Atlassian, confirms that only 4% of teams always document their projects (Atlassian, 2022). Moreover, data analysis suggests that sharing knowledge and information leads stakeholders to understand solutions to a greater degree.

The analysis has also highlighted that a lack of knowledge sharing, and documentation often creates key man dependencies in the organisation, which poses a business continuity risk to the entire organisation. Another participant mentioned that when skilled individuals leave the team or organisation, it might be difficult to maintain the automated solution due to the lack of knowledge sharing or documentation.

6.2.6. Lack of R&D Facilities

Organisations must constantly invest in their research and development (R&D) to remain competitive in today's fast-paced economy. To develop new products and techniques to provide a sustainable competitive advantage in their respective markets. Hence, some highly competitive organisations such as Google and Facebook invested $31.56 billion and $24.65 billion U.S dollars in R&D in 2021 (Statista, 2023).

The data analysis further highlighted that the organisation does not provide R&D facilities and freedom where employees can extensively explore new tools and technologies, including technologies that can be used for business process automation. These technologies can later be presented to the architecture board for use and approval should they satisfy the use case with justifiable cost-benefit analysis and governance. Literature maintains that organisations not investing in research and development will be disadvantaged (Gartner, 2022).

6.3. Research Question 2: Organisational Impediments

How does organisational context affect the adoption of automation in business processes?

Organisational impediments consist of factors that are internal to the organisation; these factors influence the adoption of innovation. Iacovou et al. (1995) and Jeyaraj et al. (2006) emphasise that the organisation's size, organisational structure, and management support are the main factors that influence the adoption of innovation in the organisation. Moreover, some factors that influence innovation in the organisation include support from top management (Jeyaraj et al., 2006; Sabherwal et al., 2006) and overall readiness in the organisational (Iacovou et al., 1995).

6.3.1. Siloed Centre of Excellence (CoE)

The centre of excellence, also known as the CoE, is a separate function in the organisation tasked with strategizing, implementing, and maintaining business process automation solutions and tools for the bank. The team comprises various skill sets, which include business analysts, process engineers, automation specialists, and test analysts, to name a few. Literature maintains that effective and efficient teams

work closely together and contribute towards a common goal and the organisation's success (Akbar et al., 2020). However, according to the data insights, the CoE function is standalone and has a separate mandate; although the CoE team has exceptional automation skillsets, they still lack comprehensive IT system specialisation and business acumen, which often impedes the adoption of business process automation in the organisation.

Moreover, the data insights presented an overwhelming consensus which indicated that the CoE being further from business extends the time it takes to automate business processes due to the prolonged chain of command, in addition to the CoE having their prioritisation. This is consistent with (Du Plessis, 2017), who argues that agile organisations with flat structures are more efficient and can reach a consensus more rapidly. The research data has further highlighted that it is often difficult to understand the type of skillset and capabilities within the CoE because of the low prominence of the CoE team.

6.3.2. Deficient BPA Readiness

Literature suggests that readiness is an important factor for innovation in any organisation. For organisations to succeed in their innovation journey, they need to be financially, culturally, and technologically (Akbar et al., 2020). The research data has revealed that a robust focus on business process automation was introduced late in the bank with the introduction of the CoE team in 2017, which was formerly mandated to focus solely on designing, maintaining, and optimising business processes in the bank. Then recently, in 2019, the CoE added the function of automation which seemed to be a logical progression for the team. The late introduction of business process automation has caused a delay for the bank to automate its business processes fully.

As a newly integrated team, the CoE team had to start from scratch, beginning with building the team, acquiring necessary skillsets, positioning themselves in the organisation, identifying areas that require automation, purchasing the correct automation tools, etc. According to Ali et al. (2021), building an effective team takes 4-6 months and getting it to a productive phase.

6.3.3. Lengthened Approval Process for New Solutions

The research data has highlighted the frustration IT leaders and professionals in the banking sector face concerning approving new tools and technologies. The data highlights that new automation technologies and solutions often take time to get approved in the bank, mainly due to the lengthy approval process and due diligence required for the approvals. A census of senior architects on various approval boards responsible for approving new software and tools in the bank maintains that some software requires three board approvals. The approval process can take three to six months, depending on the tool or solution.

To crystallize the point above, other participants further highlighted that the approval process takes a long time because it depends on multiple factors. This includes detailed analysis to determine if a similar tool can meet the presented use case, governance, security, and cost-benefit analysis, among other factors. Rightfully so, because the South African banking sector is highly regulated, banks need to conform to set best practices and stringent governance. According to the literature, the finance and banking industry is the most regulated globally, right after manufacturing at the top (Stulz, 2019).

6.3.4. Job Insecurity

Another critical point that multiple participants highlighted includes a people aspect that should be considered in adopting any innovation. The literature argues that employees affected by the change must be included in the process from inception for any innovation or solution to be successful. Failure to include employees often results in a reluctance to adapt and failure to comply with the new change (Kaur et al., 2020).

Moreover, the data analysis has highlighted the reluctance of system users and specialists to actively identify areas of improvement and automation for functions they see as critical for their KPIs and performance review. These users and specialists believe that automation will deem them redundant and replaced, which is not a positive attribute for an organisation that wants to adopt automation in its business processes.

6.3.5. Inadequate Advanced BPA Skills (AI and Machine Learning)

The research data highlights that the organisation is still in its infancy concerning business process automation; as a result, there are no advanced automation skills such as artificial intelligence (AI) and machine learning (ML). The data indicates that the CoE function implements basic automation using techniques such as robotics process automation (RPA) which is mainly reactive and applies to application systems automation. This lack of advanced skills hinders the organisation's adoption and acceleration of business process automation.

The literature emphasises that organisations that want to remain competitive in the 21st century need to take advantage of advanced technological advancements such as Machine learning (ML), artificial intelligence (AI), and hyper-automation (Castillo et al., 2021). The literature further adds that organisations that fail to do so will be at a disadvantage and lag their competition (Gartner, 2022).

6.3.6. Inadequate CoE Visibility in the Organisation

The research insights highlighted a lack of visibility on the functions and mandate of the CoE function in the organisation, CoE, which is a team responsible for business process optimisation and automation in the organisation. Due to the lack of visibility, the research data suggests the CoE is not being utilised fully, thus impeding business process automation adoption in the organisation. Five participants out of twelve went as far as mentioning that they had no knowledge regarding the existence of the CoE in the organisation, thus, had no idea how to contact the team for new projects.

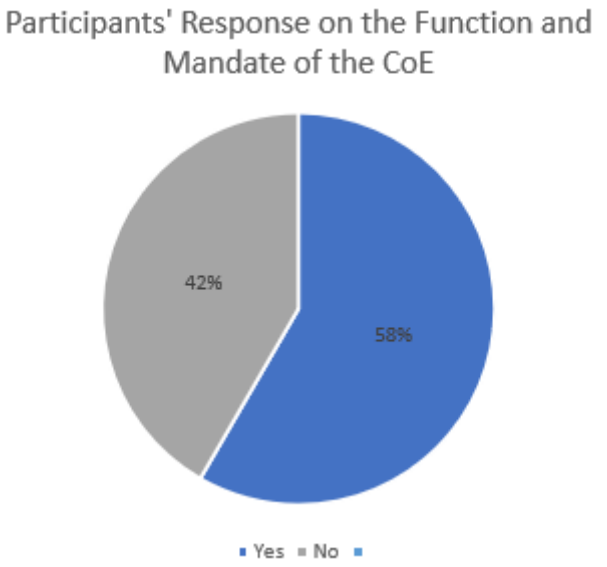

Figure 9: Participants' Response to the Function and Mandate of the CoE.

Figure 9 above depicts participants' responses when asked about the visibility of the CoE in the organisation. Surprisingly, only 58% (7 out of 12) of the participants are aware of the functions and mandate of the CoE in the organisation, let alone the existence of the CoE.

Contrary to the abovementioned point, the head of CoE and the head of technical architecture believe the CoE has done tremendous work in positioning and promoting themselves in the organisation. Moreover, the heads further believe the entire organisation should be aware of the CoE's functions and strategic objectives in the bank. However, the inconsistency in the insights raises further concerns regarding the positioning and marketing strategy of the CoE within the organisation; although the CoE is a standalone entity, its purpose is to solve the bank's problems and accelerate business process automation and innovation.

6.3.7. Competing Priorities/ Delegation of Duties

Like any organisation, banks also have limited resources, which they need to strategically channel to investments and solutions to offer them a sustainable competitive advantage. The banking landscape is more competitive than ever; banks are facing competition from FinTechs, blockchain technologies, and virtual banks (Ramdani et al., 2020). The research insights have highlighted that most IT and

business experts in the bank focus on their primary job requirements and rarely look for new tools and solutions they can adopt to automate some of their business processes and IT systems.

Moreover, participants believe that the failure to actively scout for new areas of improvement is one of the key reasons the bank's innovation adoption is impeded. Additionally, the data highlights that system users are comfortable with how IT systems and business processes currently function, thus solely channelling their energy and expertise into maintaining existing business processes and remaining within their job description. Contrarily, the literature suggests that organisations that want to be successful in their technological innovation should strive for continuous improvement (Curry et at., 2021). Moreover, if the bank wants to accelerate its business process automation adoption, it must encourage a culture that rewards continuous process improvement and innovation (Ali et al., 2021).

6.3.8. Absence of Formal BPA Logging Process

Another impending factor that was highlighted by the data insights that hinder the adoption of business process adoption is the manual process of logging new projects. The CoE has existed since 2017, and by now, there should be a formal and automated system that allows and manages the logging of new projects with the CoE team; however, the system does not exist yet. The research data highlights that the lack of a formal and automated process often causes confusion and impedes the adoption of automation in the bank.

Moreover, participants have emphasised that to log a request with the CoE team, one must send an email with their requirements to the CoE's email address, and someone will address the request; after that, the request might get prioritised. Another participant argues that the organisation has an internal formalised system that manages requests, incidents, and problems and believes the CoE can leverage that system. ITIL framework provides best practices and guidelines on how organisations can manage their IT infrastructure and processes, which the bank can adopt to operationalise the logging process for the CoE team (Curry et al., 2021).

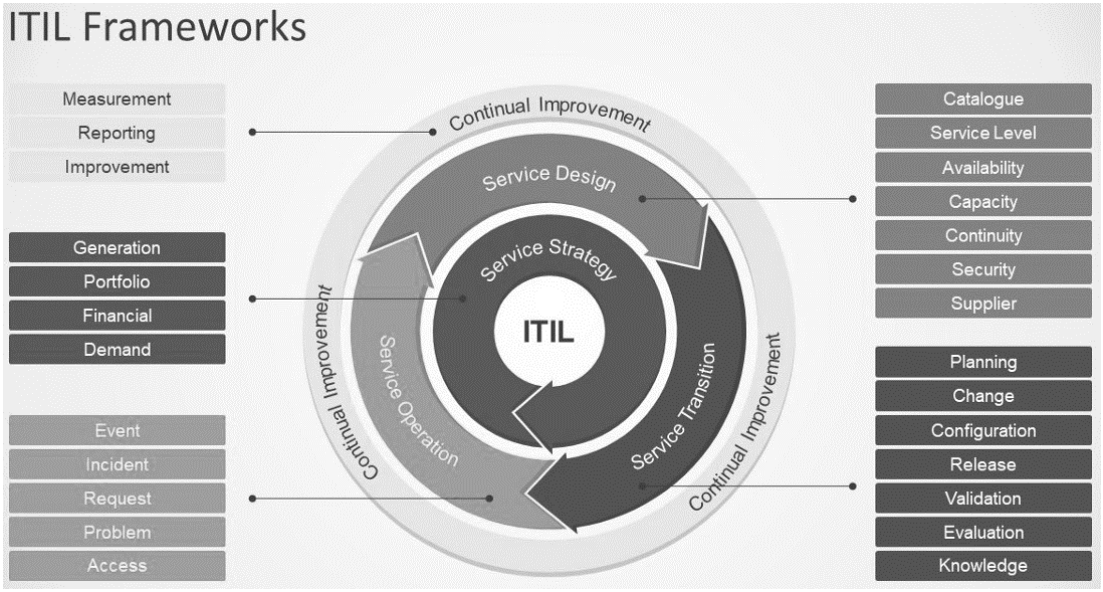

Figure 10: ITIL framework for initiating and managing BPA solutions in the organisation, Adapted from (Munna, 2022)

6.3.9. Delayed Access to Business Systems

When the proposal for a use case has been validated and resources allocated, the CoE team requires adequate access rights to access IT systems for analysis, testing, development, and implementation, which the access control team needs to grant. However, this does not seem always to be the case, as the research data highlights the frustration the CoE team encounters in some cases where there is a delay in granting the CoE access to the IT systems. The delay in granting the team access impedes the adoption of business process automation in the bank because the CoE cannot proceed with their work without the relevant system access.

6.4. Research question 3: Environmental Impediments

How does the organisation's environmental context affect the adoption of automation in business processes?

The last section of the discussion chapter aimed to understand the impediments to BPA adoption from an organisation's environmental perspective. Environmental impediments refer to factors that exist in the business environment, and these are the factors that the organisation does not have direct control over but may affect its

operations. Environmental factors include political, social, competitors, regulations, and governance. The environmental context addresses opportunities and constraints for technological innovation (Scupola, 2005).

6.4.1. Overflooding of Business Process automation tools in the market

The research data has highlighted the predicament the organisation faces when choosing the right automation tools due to overflooding of automation tools in the market. According to Gartner (2023), there are over 20 advanced tools that individuals and organisations can use to automate their business processes. These tools include the UiPath Platform, Automation 360, Blue Prism intelligent automation platform, TruBot, and AutomationEdge. Although having many automation tools in the market may seem like a positive outcome, most participants disagree as they claim that it often lengthens the time it takes for organisations to select the correct tool. Due to various factors such as technological compatibility, ease of maintenance, proven reliability, compliance, governance, and skillset in the market, among other factors.

Moreover, the research data has further highlighted that there isn't one solution that fits all. The organisation requires multiple tools to automate their business processes in the bank, and those tools need to pass a detailed internal checklist, a consensus expressed by various studies. In addition, participants believe that due to the rate that automation tools are advancing, it is difficult for organisations and individuals to keep up.

6.4.2. Rapid Emerging Competition

The banking industry is one of the top industries facing emerging competition, together with the automotive industry and retail (Statista, 2023). The banking industry faces competition from emerging competition, including but not limited to the blockchain, FinTechs, digital banking, and currencies. To bring this to light, companies like Apple have started offering customers friendly payment options to their customer.

The research data confirm that the technological advancements and fierce competition faced by banks forced caused banks to constantly evaluate their value proposition and market positioning and stretch their limited resources to remain competitive in the

evolving market. These rapidly emerging markets and technology are putting a predicament on banks as they constantly need to Banks are required to focus on all these technologies; however, most banks are suffering to keep up, and they often drown in the noise or assume everything is just noise, and this often delays the adoption of innovation in banks.

6.4.3. Competitive Marketplace for Skilled Talent

The research data has highlighted how the banking industry is losing exceptional talent due to the limited creative stimulation they get in the banking industry, mainly because of legacy systems, lack of exploration, and stringent governance around banks. Another participant went as far as mentioning that the objective of the bank is to seek and manage investment and maximise shareholder provide. Another participant who was once a developer and is now a solutions architect articulates the dilemma organisations face that do not fully utilize their talent.

The research data reveals that banks do not offer sufficient creative freedom for technology and new solution exploration, thus deemed as “not fun for tech geeks”,

6.4.4. Stringent Governance and Regulations

The banking industry is one of the highly restricted and monitored industries in South Africa, which limits the level of automation and tools that can be used in banking services. These stringent governance grounds to red tape for organisations when introducing new technologies and automated solutions. Due to the nature and sensitivity of the information, which is highly regulated by laws and regulations such as the Protection of personal information act (POPIA), banks should always be cautious with their technological innovations. The research data shows a set of tools approved by the architecture board which can only be used in the bank, and these tools must strictly comply with the banks and industry policies and governance. The bank and its employees would not simply choose any tool they feel is relevant for their use case and start utilising that; they must go through governing bodies to get relevant approvals. Getting these approvals and only being able to use limited tools and technologies is somewhat impeding the adoption of business process automation in the bank.

6.5. Conclusion

This chapter has presented a detailed discussion of the research findings and managed to answer the research questions. Impediments to adopting BPA were categorised into 3, technological, organisation, and environmental impediments. The banking industry is highly regulated in South Africa; therefore, utilised tools must comply with organisational and industry policies and governance. The data indicates that the CoE function implements basic automation using techniques such as robotics process automation (RPA) which is mainly reactive and applies to application systems automation. Moreover, if the bank wants to accelerate its business process automation adoption, it must encourage a culture that rewards continuous process improvement and innovation.

The next and concluding chapter will present the conclusion and management implications.

7. CONCLUSION AND MANAGEMENT IMPLICATIONS

7.1. Introduction

This chapter of the research study will provide the conclusion and recommendation by summarising key findings of the impediments affecting the adoption of business process automation in South African banks from IT leaders and professionals in the South African investment bank. Secondly, the chapter will provide management implications and limitations observed during the research study.

7.2. Principal findings

The research study has achieved the objective of the research discussed in the first chapter above, which was to understand the impediments to adopting business process automation in the banking sector with a view from IT leaders. The research study managed to uncover three domain areas with the guide of a TOE model, which aims at understanding the impediments of innovation adoption broken down into three domains: technological, organisation, and environmental. The research study

highlighted that most impediments to adopting business process automation reside within the organisation, where nine impediments were identified, followed by technological impediments with six impediments. Lastly, the environmental impediments have four factors identified.

Technological impediments refer to technologies available to the organisation for adoption and utilisation in the expedition to adopt business process automation, including technologies the organisation poses and those available in the market. Previous studies have shown that technological factors are key to organisational innovation.

Technological impediments	Technical and integration Incompatibility
	Financial Constraints
	Legacy Systems
	Complexity of Translating Business Requirements into Technical Requirements
	Inadequate Technical Knowledge Sharing
	Absence of R&D Facilities for Exploration

Figure 11: Summary of technological impediments to the adoption of BPA

Organisational impediments are the factors that are internal to the organisations, and these factors influence the adoption of innovation in the organisation.

Organisational impediments	Siloed Centre of Excellence (CoE)
	Deficient Business Process Automation Readiness
	Lengthened Approval Process for New Solutions
	Job Insecurity
	Lack of Advanced Automation Skills
	Inadequate CoE Visibility in the Organisation
	Competing Priorities/ Delegation of Duties
	Absence of formal and Automated Processes
	Delayed Access to Business System (for Analysis and Automation

Figure 12: Summary of organisational impediments to the adoption of BPA

Environmental impediments refer to factors that exist in the business environment, and these are the factors that the organisation has direct control over but may affect its operations. Environmental factors include political, social, competitors, regulations, and governance.

Environmental impediments	Overflooding of Business Process automation tools in the market
	Emerging Competition
	Competitive Marketplace for skilled Talent
	Stringent Governance

Figure 13: Summary of environmental impediments to the adoption of BPA

7.3. Management implications and other relevant stakeholders

The research study and the literature have identified some of the management implications which the organisation and IT leaders can adopt to accelerate the adoption of business process automation (BPA) in the bank. The following actionable insights have been identified and discussed.

7.3.1. Senior Management

- Management should position the CoE function for success within the organisation. The research data suggests the CoE function needs an automation champion to help facilitate access to business systems and engagement with various systems owners and businesses relating to BPA initiatives and management of solutions.

- Investing in research and development (R&D) facilities, R&D is critical for any organisation that needs to remain competitive. The research data suggests that the organisation should develop R&D facilities where users can collaborate and explore new technologies to resolve real-life automation use cases. This will help get solutions quicker and more accurately.

- Management should create a culture that embraces innovation exploration. Innovative system users should be rewarded and valued, and this needs to come from management filtering down to field workers.

7.3.2. Centre of Excellence (CoE)

- The CoE should design and implement monitoring and measuring techniques to help the CoE and management track BPA solutions and benefits. The research data suggests this will increase buy-in and motivate the organisation to invest more in the solutions. Moreover, this will increase the visibility of the CoE in the organisation.

- It is recommended that the CoE invests in an interactive information management system (IMS), which will allow users to log new project requests and monitor their projects' progress status.

- It is recommended that the CoE should be embedded in various business units. This will increase buy-in from business units and provide the CoE with relevant business and systems knowledge, which will be beneficial when designing and implementing BPA solutions.

7.3.3. Centre of Excellence (CoE) and Solutions Architects

- The CoE and solutions architects should engage and involve system users in automation projects, from the ideation to the completion phase. This will help manage job insecurity and improve employee morale. Involving users in all stages of the project will help them understand that automation is not there to take their jobs but rather to help them perform their duties more efficiently, effectively, and error-free.

7.4. Limitations of the research study

The researcher has identified limitations that apply to the study, highlighted below.

- Qualitative findings cannot be replicated and generalised to the population, but inferences can be made from similar settings. Moreover, because the sample was drawn from the same industry, insights cannot be extrapolated to other industries.

- The study sample was limited to one investment bank based in South Africa, limiting the generalisability of the findings. The findings of this research study are not a full representation of all banks in South Africa.

- Thematic analysis is subject to biases as codes, theme definitions, and classification necessitates the researcher use their judgement. The researcher has, however, employed triangulation methods to minimise the biases during the data collection and analysis.

- The researcher is employed by the investment bank and has a vested interest in the research study's findings. This interest can be accompanied by unconscious bias.

7.5. Suggestion for future research study

This section provides suggestions for future research. Based on this research study's insights, the potential future research areas are recommended below.

- Conduct a similar study in a different industry, such as manufacturing, which has the highest percentage of automation.

- Conduct a comparable study in more developed countries such as China, the leader in business process automation.

- Investigate the role and impact of a centre of excellence (CoE) concerning an organisation's innovation level.

- Conduct a comparable study on South Africa’s big four banks on the level of business process automation in their organisation.

7.6. Conclusion

The research study has provided new insights into factors that impede the adoption of business process automation in the investment bank in a South African context. Qualitative data was collected with semi-structured interviews with IT managers and professionals in the bank. Findings were presented using the technology, organisation, and environments (TOE) approach. Key findings were around technical and integration incompatibilities, legacy systems, lack of research and development facilities, and lack of technical knowledge sharing. Moreover, organisational impediments were around decentralised centre of excellence (CoE), job insecurity, lack of advanced automation skills, and lack of formal logging process for new projects.

Management implications recommended that IT system users be included in all phases of projects to manage job insecurity. Develop a research and development

facility where users can explore new technologies and solutions in real-life use cases. Embed the CoE team in business units to equip them with depth business and system understanding. Lastly, implement measuring and monitoring processes to track the development and benefits of each automation. Future research should investigate the impediment of business process automation in a different industry, such as manufacturing which is a leader in automation. Secondly, conduct a comparative study in developed countries such as China which is a leader in technological innovation.

…… End of Chapter 7 ……

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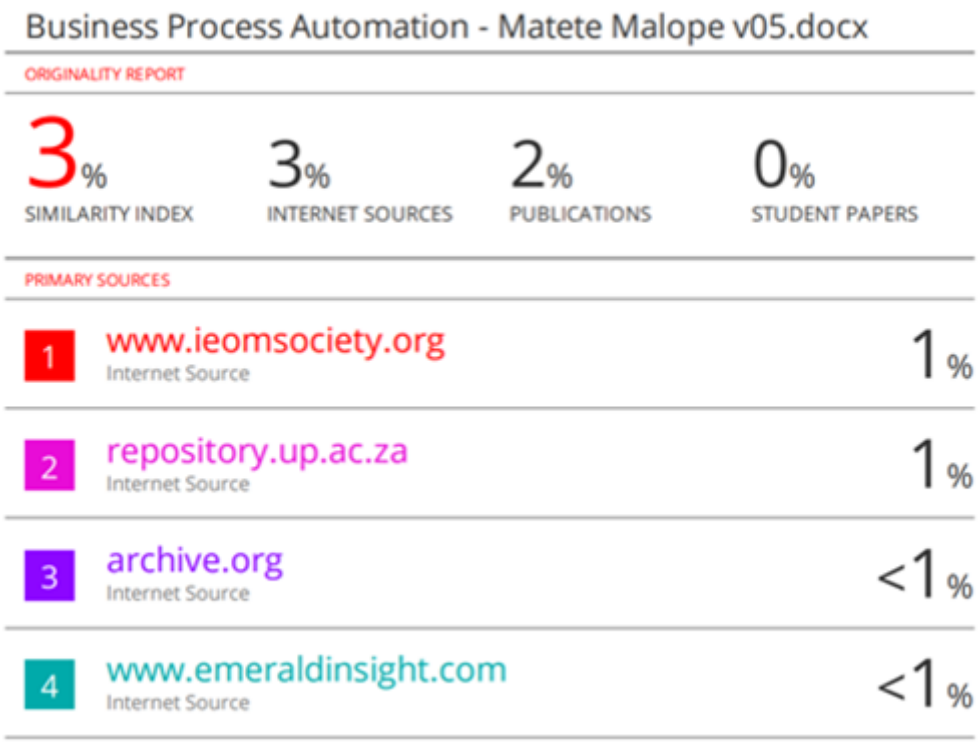
APPENDIX A: TURNITIN ORIGINALITY SCORE

The full Turnitin report has been signed by the supervisor and sent to the faculty via email.



Business Process Automation - Matete Malope v05.docx

ORIGINALITY REPORT

3%	3%	2%	0%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	www.ieomsociety.org Internet Source	1%
2	repository.up.ac.za Internet Source	1%
3	archive.org Internet Source	<1%
4	www.emeraldinsight.com Internet Source	<1%

APPENDIX B: LETTER OF INTRODUCTION AND INFORMED CONSENT

Letter of Introduction and informed consent

IMPEDIMENTS TO THE ADOPTION OF BUSINESS PROCESS AUTOMATION (BPA) IN BANKING: A PERSPECTIVE FROM IT LEADERS AND IT PROFESSIONALS IN A SOUTH AFRICAN INVESTMENT BANK

Dear participant

My name is **Matete Malope**, I am a master's student at Wits Business School (WBS). I am currently conducting a research study to understand main factors that are hindering banks from strategically integrating automation technologies in their business process for improved firm performance. I would like you to be part of my study by answering a few questions attached in a separate document in an interview, there are 12 questions in total and the interview should take approximately 40 minutes.

Please note that:

- Information shared in our sessions will be used for academic purposes.
- All sessions will be recorded for further transcription and analysis.
- All information shared is this session will be anonymous.
- My may choose to not participate at any given time, without any consequences.
- For further questions or comments, you may contact my study leader, Prof George Latridis on george_iatrides@yahoo.co.uk.

Please sign below to ensure that you have read and understood the information provided above and that you give consent to voluntarily participant in this study.

_____ _____

Participant's signature Date

_____ _____

Researcher's signature Date

APPENDIX C: ETHICS CLEARANCE (WBS/BA2508295/507)

Graduate School of Business Administration
University of the Witwatersrand, Johannesburg

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

Ethics Clearance Certificate

Ethics protocol number: WBS/BA2508295/507

This certificate is only valid with a legitimate ethics protocol number and signed by the Researcher (below).

Project title	Opportunities and challenges for intergration of automation in the South African banking sector
Investigator / Researcher	Mr Matete Elias Malope
Nature of Project	MBA (Research Article)
Decision of the Committee	Approved, provided stakeholders and participants are guaranteed confidentialty.
Issue Date of Certificate	2022-09-01
Expiry date	Date of submission of the project / research report
Chairperson	Prof Anthony Stacey ☎ +27 11 717 3587 +27 82 880 4531 anthony.stacey@wits.ac.za

Declaration by Researcher

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

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

Emalope — Signature

07/ 09/ 2022 — Date:

APPENDIX D: CONSENT FROM THE ORGANISATION

LOGO

12 July 2022

To whom it may concern:

I [redacted] as a delegated authority of [redacted], hereby provide permission to the primary researcher **Matete Malope** (student number: 2508295) of the faculty of commerce, law, and management at Wits Business School (WBS), the following:

To engage with employees of the [redacted] with the purpose of collecting and analysing data relating to factors that are hindering the adoption and integration of hyper-automation in our business processes, with a view from IT leaders in the banking sector. I have reviewed the questionnaire provided by the researcher and hereby give my approval for using the questionnaire for data collection.

Information collected in this research study will be purely used for academic purposes and will not be used for any other purposes.

Singed: [redacted] Date: 15.07.2022

[redacted]

Chief Information Officer: Markets Platforms

APPENDIX E: TABLE OF ACRONYMS

Acronym	Full name
AI	Artificial Intelligence
BPA	Business Process Automation
BU	Business Unit
CoE	Centre of Excellence
DEV	Development
IT	Information technology
IS	Information Systems
ML	Machine Learning
PROD	Production
RPA	Robotic process automation
R&D	Research and Development
TOC	Theory of Constraints
UAT	User Acceptance testing

…… End of report ……