UNIVERSITY OF LJUBLJANA
SCHOOL OF ECONOMICS AND BUSINESS

MASTER'S THESIS

IMPLEMENTING ROBOTIC PROCESS AUTOMATION IN THE LOGISTICS PROCESSES AT TWO SELECTED COMPANIES

Ljubljana, June 2025

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AUTHORSHIP STATEMENT

The undersigned Seda Volina, a student at the University of Ljubljana, School of Economics and Business (hereafter: SEB LU), author of this written final work of studies with the title implementing robotic process automation in the logistics processes at two selected companies, prepared under supervision of assoc. prof. Anton Manfreda.

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API – Application Program Interface
BPMS – Business Process Management Suite
BPM – Business Process Management
BPA – Business Process Automation
CH – Case Handling
CRM – Customer Relationship Management
CSF – Critical Success Factor
EAI – Enterprise Application Integration
IT – Information Technology
RPA – Robotics Process Automation
UI – User Interface
WFM – Workflow Management

1 INTRODUCTION

Businesses globally are undergoing significant changes driven by technological innovations and globalisation. Recently, the concept of digital transformation has gained prominence, with most businesses concentrating on automating their procedures and digital infrastructures to enhance customer value, efficiency, productivity, and lower expenses (Lacity et al., 2020). Additionally, firms are proactively exploring methods to boost their digital skills and optimise their operations to stay competitive in the rapidly evolving business landscape (Lacity et al., 2020). Robotic Process Automation (RPA) is a technology that employs software robots to carry out repetitive and rule-based tasks typically handled by human employees. As digital transformation accelerates, RPA has gained traction as a favoured means for businesses to automate processes and cut costs.

The implementation of Robotic Process Automation (RPA) is gaining popularity across numerous sectors, as it enables companies to automate mundane and rule-based tasks. A recent analysis by Gartner indicates that the RPA market experienced a 41% growth in global revenue in 2021 compared to the previous year (Gartner, 2021). The main goal of implementing RPA is to enhance the efficiency and effectiveness of business operations by automating repetitive and time-intensive activities, thereby allowing staff to concentrate on more strategic and value-generating tasks (Deloitte, 2020). RPA serves as a software solution that permits the automation of straightforward and repetitive tasks by programming robots (bots) to mimic human actions (Gartner, n.d.). It has demonstrated itself as a cost-efficient and practical option for companies aiming to optimise their processes and boost productivity. Nonetheless, it should be noted that this technology is a computer-based application (Aguirre & Rodriguez, 2017). RPA can be applied across various sectors, including finance, retail, manufacturing, and others (Zhang & Wen, 2021). The logistics sector is also considered a promising area for its application. Firstly, automating tasks allows employers to cut costs and take on more responsibilities by reducing errors (Mullakara & Asokan, 2020). For organisations, RPA represents an investment that provides a rapid and dependable return (Alberth & Mattern, 2017). According to a study by Wang et al. (2020), RPA has the potential to improve supply chain visibility, optimise transportation planning and routing, and simplify and automate processes such as order fulfilment and warehouse operations.

While process automation is generally seen as a beneficial change for organisations, the implementation of RPA continues to face numerous challenges. The challenge arises from the fact that not every process is suitable for automation, and if the potential risks associated with automation are not assessed beforehand, the consequences for the organisation can be considerable. Hence, it is essential to understand how to identify the processes that are appropriate for automation and which RPA tool is best suited for each specific process (Santos et al., 2020).

Conducting a detailed examination of current business processes and pinpointing repetitive, routine, and rule-based tasks can assist in determining the right processes for automation (Lacity & Willcocks, 2017). This ensures that the processes chosen for automation are fitting and can yield the expected benefits.

Furthermore, businesses need to make the right decision in choosing an RPA tool for automating processes. This is one of the main challenges that organisations face, which is complex and takes much time. According to Alotaibi et al. (2021), this decision should be based on several factors, including the complexity of the process, the scalability of the tool, and the level of technical expertise required. By choosing the right tool, companies can maximise the benefits of RPA and minimise the risks associated with implementing the tool.

Despite the increasing interest in RPA, businesses encounter difficulties in choosing the appropriate RPA tool that aligns with their requirements. One issue is the abundance of options on the market, with each tool showcasing distinct features and capabilities. A report by Gartner (2021) identifies UiPath and Blue Prism as the leading players in the RPA software landscape. While both tools serve similar functions, their features and methods of automation can vary considerably. Gaining a comprehensive understanding of the advantages and disadvantages of each tool can help us make a well-informed choice. For instance, Liu et al. (2018) discovered that Blue Prism is better suited for complex business processes due to its additional advisory feature, whereas UiPath is considered more user-friendly and has a different interface for constructing automation workflows. Furthermore, a study conducted by Wang and Chen (2019) revealed that UiPath is a better fit for smaller organisations with simpler IT environments, while Blue Prism is better suited for larger entities requiring a more sophisticated IT infrastructure.

While the implementation of RPA has the potential to improve business processes and reduce costs significantly, selecting the appropriate processes for automation and choosing the right tool can be challenging. This can lead to suboptimal outcomes and limit the effectiveness of RPA implementation. Therefore, there is a need to investigate the factors that influence the selection of processes for automation and the choice of RPA tools and provide guidelines to help organisations overcome these challenges and maximise the benefits of RPA.

The purpose of this research thesis is to analyse and understand the challenges faced by organisations in identifying the appropriate process for automation and provide a blueprint or framework for choosing the right RPA tool. A proper understanding of these challenges would enable organisations to navigate the complex process of selecting the appropriate RPA tool. The blueprint developed in this thesis would provide an outlined and simple approach to RPA tool selection, which can significantly improve organisation's efficiency, reduce cost and enhance productivity. Firstly, the goal of the study is to understand the benefits and the importance of implementing robotic process

automation (RPA) in logistics department processes in a general context, using two companies as a reference point. The study will aim to evaluate the results and possibilities of RPA implementation by automating them using UiPath and Blue Prism, two leading RPA tools.

Secondly, the thesis aims to provide a comparative analysis of two prominent RPA tools, namely UiPath and Blue Prism, both of which are recognised as industry leaders in the field of RPA according to Gartner (2023), concerning their suitability for implementation in logistics department processes. Evaluating and comparing the key features, capabilities, and limitations of these tools will help to provide insights into their relative strengths and weaknesses and identify factors to consider when selecting an RPA tool. This research thesis aims to answer the following research questions:

- Research Question 1: What are the benefits and results of implementing RPA during process automation in the logistics department for selected companies?
- Research Question 2: What are the challenges associated with the adoption and implementation of RPA in logistics?
- Research Question 3: How do different RPA tools compare in meeting a company's automation needs, and what are the key considerations for successful implementation?
- Research Question 4: How do logistics companies evaluate and select specific RPA technologies and tools for their operations?

The research thesis focuses on two undisclosed companies which use both the UiPath and Blue Prism RPA, ensuring a manageable scope. Due to confidentiality, the companies' names are withheld. The study employs a mix of primary and secondary data collection methods. Secondary sources, including relevant literature, research papers, journals, and case studies, were utilised to build the literature review, forming the initial part of the research. For primary data, the researchers conducted semi-structured interviews using questionnaires. These questionnaires were sent to the logistics departments of the involved companies, aiming to gain insights into their processes and understand the transformation brought about by RPA.

The first chapter of the thesis focuses on the general overview of Robotic Process Automation. The second chapter explores the relevant related literature on Business Process Automation and RPA. The third chapter focuses on RPA implementation and methods of implementation. The fourth chapter discusses the methodology, while the fifth chapter consists of case studies for both companies. In this chapter, the analysis of the primary data from the companies will be carried out. The fifth section involves discussion, presenting answers to all research questions and different viewpoints from company employees concerning RPA. These perspectives serve as the foundation for assessing the effectiveness of RPA implementation. The final chapter provides a summary of the findings, outlines research constraints, and offers prospects for future research.

2 UNDERSTANDING BUSINESS PROCESS AUTOMATION AND ROBOTIC PROCESS AUTOMATION

This section reviews relevant literature on Business Process Automation (BPA) and Robotic Process Automation (RPA). We begin by dissecting the fundamental concepts of business processes and process automation. Subsequently, we delve into RPA, examining its benefits, types, challenges, and implementation methods. This review aims to offer a comprehensive understanding of BPA and RPA.

2.1 Defining Business Processes and Business Process Management

Davenport (2003) characterises business processes as a series of activities that are structured and evaluated, aimed at achieving a specific result for a customer or market. This definition from Davenport illustrates how tasks are executed within an organisation, highlighting not just the end product. A business process entails a systematic organisation of work activities that aligns with both time and space, possessing a clear beginning and end, with well-defined inputs and outputs that serve as a foundation for action. Processes are the mechanisms or frameworks through which an organisation generates value for its customers. Hence, processes must be adjusted to meet the requirements of the client. In a similar vein, Weske (2007) offered a brief yet thorough description of a business process, defining it as a series of coordinated actions performed within an organisation and technical contexts to accomplish a specific business goal.

According to Brocke and Rosemann (2010), Business Process Management (BPM) serves as a strategic framework that aligns an organisation's operations with customer needs. They highlight that BPM is a method focused on enhancing business efficiency and effectiveness; it also encourages innovation, flexibility, and facilitates the smooth integration of technology. This method enables organisations to effectively monitor their processes, pinpoint areas needing improvement, and explore opportunities for development (Dumas et al., 2013). Over the years, the concept of Business Process Automation (BPA) has evolved into Workflow Management (WFM), Case Handling (CH), Enterprise Application Integration (EAI), and Customer Relationship Management (CRM) (Weske et al., 2004). Weske (2007) notes that BPM can be categorised into essential phases such as design and analysis, modelling, configuration, enactment, and evaluation.

2.1.1 The Role of Robotics Process Automation in Business Process Management

It is crucial to understand the connection between BPM and BPA. Matt (2023) provided an engaging yet fitting analogy for these two ideas by comparing them to a sports team, where RPA is likened to an individual play, and BPM is similar to an experienced coach. Every business consists of various tasks, events, and decisions that form their processes;

BPM is vital in organising, enhancing, and optimising these business processes from start to finish. Epsoft (2022) supports this view by stating that BPM serves as a framework that outlines and structures end-to-end workflows, offering a more precise visualisation of how tasks are executed within an organisation.

On the other hand, RPA is a low-code solution that enhances and simplifies the execution of tasks while concentrating on individual functions within a process. For instance, in the context of invoice processing, BPM enables the organisation to visualise the entire lifecycle of an invoice, from its initial receipt and routing to its documentation, reconciliation, and final payment. BPM outlines this detailed perspective, granting organisations a clearer insight into their operations. This understanding assists organisations in making strategic choices regarding which processes should incorporate RPA. In the same invoice processing example, RPA can automate specific functions such as invoice matching, coding, and data entry. Therefore, while BPM offers the primary framework for managing, optimising, and organising business workflows, RPA serves as a tool that allows individual elements of the workflow to function efficiently through automation.

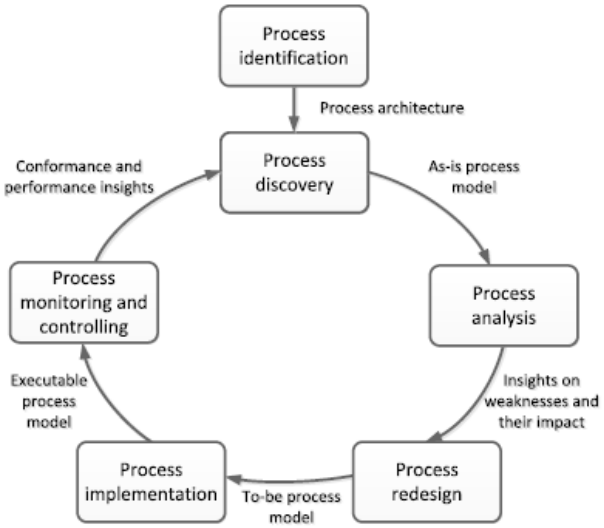
2.1.2 Business Process Management Cycle

According to Dumas et al. (2013), the BPM life cycle is a continual process that is carried out in phases, which means that the cycle is repeated and does not end at the final phase. The author explains that the outcome of the monitoring and controlling phase is sent back into the discovery, analysis and redesign phases to restart the entire process. Dumas et al. (2013) illustrated the six phases of the BPM cycle, as shown in Figure 1. The phases include identification, discovery, analysis, redesign, implementation, and monitoring and control.

Dumas et al. (2013) provide a detailed explanation of the BPM lifecycle, which consists of several phases designed to optimise business processes:

The BPM lifecycle begins with the process identification. In this phase, a business problem is detected and presented, which leads to the identification of the relevant processes that are interlinked with each other. The outcome of this phase would lead to the birth of a new process architecture that provides a holistic perspective of processes in the organisation and shows the relationship between these processes (Dumas et al., 2013).

Figure 1: Business Process Management (BPM Lifecycle)



Source: Dumas et al. (2013)

The next phase is process discovery, which is also known as the as-is process modelling; the present condition of the relevant processes is documented through the use of one or several as-is process models (Dumas et al., 2013).

After the process discovery phase, the process analysis phase is initiated to identify the issues that are connected to the as-is process, documentation of these issues is also done simultaneously, the main aim of this phase is to have organised documentation of issues that are prioritised based on their effect and the estimated effort and resources required to resolve them (Dumas et al., 2013).

Following the process analysis phase is the redesign phase, also known as the process improvement. The aim of this phase is to determine modifications that can be made to the process in order to resolve issues identified in the previous phase as well as help the organisation achieve its targeted performance goals (Dumas et al., 2013).

The following process analysis is the process redesign phase (also called process improvement). The goal of this phase is to pinpoint changes in the process that can resolve issues identified earlier and help the organisation achieve its performance goals. Several options are evaluated and compared based on the selected performance measure. Process redesign and analysis are carried out at the same time, the process analysis technique is used to analyse proposed changes, the best options for the changes are adopted and integrated, which results in a process redesign, the outcome of this phase is typically a to-be processing model that provides the framework for the following phase (Dumas et al., 2013).

The process implementation phase begins following the definition of the to-be process model, the required modification necessary to transition from the as-is process to the to-be process is planned and carried out (Dumas et al., 2013).

The last phase is the process monitoring and controlling phase, where the data collected in the implementation phase is collected and analysed. This data is related to the process performance and objectives. Analysis of the data helps in identifying bottlenecks, recurring errors, or deviations from the expected behaviour. Corrective measures are implemented to tackle the bottleneck. The cyclical process ensures continuous improvement since new problems may arise in the same or other processes.

2.1.3 Business Process Management Suite

To ensure a better understanding of the BPM cycle, it is crucial to examine the tools that facilitate effective BPM implementation thoroughly. As interest in BPM grows in both the academic and commercial worlds, advanced BPM solutions have also emerged (Malinova et al., 2014). One such solution is the Business Process Management Suite (BPMS), which is software that serves as a central point of control for business processes and the coordination of their execution (Dayal et al., 2001). Almeido et al. (2012) explain that business process workflow can either be system-based or human-based, or a combination of both, while BPMS uses its workflow engine to keep track of business processes and provide insight into their success and failure. In summary, when the business process fails, a BPMS is utilised to identify, monitor and evaluate such processes.

From an IT architecture perspective, a BPMS serves as an additional layer of software that operates above other software programs. It uses business process specifications to determine when to initiate or call other software programs (Almeido et al., 2010). Several BPMS vendors, including Appian BPM Suite, Oracle BPM Suite, and Bizagi, have provided software suites that support the BPM cycle. These are categorised as either open-source or commercial software. The features and applicability of open-source and commercial software were compared in a number of studies with a focus on various parts of the world. These studies emphasise the need for BPMS to provide management tools that can link key performance indicators (KPIs) to each business process and monitor them using KPI measurements and target values (Waszkowski & Kowalski, 2017; Nafie & Talab, 2013; Almeido et al., 2012).

Jeston and Neils (2014) explain that BPMS can accommodate the integration of BPA, which enables organisations to automate repetitive tasks through process modelling, which allows for seamless end-to-end processes in any organisation. Additionally, BPA capabilities can be strategically aligned with BPMS, which pinpoints relevant areas of the business where automation can have maximum impact (Davenport, 2003). Furthermore, Chris (2022) explains that the combination of BPA and BPMS improves workflow

optimisation, BPMS is a tool that organisations utilise to monitor, analyse and identify bottlenecks that are associated with processes as well as map out areas that require improvement. On the other hand, BPA makes it possible to automate identified processes. This indicates that a more streamlined workflow can be achieved through the combination of BPA's automation capabilities and the BMPS's comprehensive management features.

According to Fingar (2017), the alignment of BPA and BPMS will aid the decision-making that is based on real-time data and analytics in organisations, BPA is utilised for automating data collection and processing, while BPMS analytical tools are utilised to measure key performance indicators that are associated with business processes. The combination of these tools ensures that accurate information is regularly available for decision-makers of the organisation to make informed decisions. Additionally, Jeston and Neils (2014) opined that operational cost and increased efficiency can be achieved with the use of the combination of both BPA and BPMS. BPA nature essentially reduces the need for manual labour and minimises or eliminates errors, which will result in improved accuracy and cost-saving, while BPMS eliminates silos and redundancies by providing a centralised platform that manages and streamlines business processes.

2.2 Process Automation

Automation is becoming increasingly important and gaining prominence in today's world as it leverages the capabilities of advanced technologies like artificial intelligence and machine learning to perform complex tasks (Laserfiche, 2023). Smith (2017) stresses that the importance of automation cannot be overemphasised, as it allows organisations to focus more on the strategic aspect of their operation and move beyond the routine and repetitive activities of their operation. However, it is crucial to understand process automation, as it forms the foundation of RPA.

Gartner (2023) describes Business Process Automation (BPA), also known as process automation, as the use of advanced technologies to streamline and automate complex business processes and functions. As against traditional data handling and record-keeping activities, process automation focuses on operations that are critical to running an organisation, it supports skilled workers in an organisation to effectively meet the demands and needs of various stakeholders.

Process automation relies heavily on IT to improve the efficiency of business processes (Shin & Jemella, 2002). IT is crucial to the success of business automation as it enables businesses to operate seamlessly in multiple locations while ensuring prompt and timely service delivery to customers (Zygiaris, 2000).

2.2.1 Types of Business Process Automation

Guilherme (2024) highlights some specific types of BPA. He explained that although BPA is usually seen as one element of process management strategy, it can also be all-encompassing of different types of automation.

Firstly, task automation is a type of automation that aims to reduce or eliminate manual tasks embedded within a process, such as sending emails, generating documents, or capturing signatures (Guilherme, 2024).

Secondly, workflow automation, where automation is applied to a defined sequence of activities or tasks. Some workflows allow for every task to be automated, while in other workflows, some tasks are automated, and those that require decision-making and critical thinking initiative will be handled by employees (Guilherme, 2024).

Following that is robotic process automation (RPA), which involves the utilisation of specially designed software bots to automate repetitive tasks that are structured and follow the same sequence consistently. RPA is particularly well-suited for activities that do not necessitate any form of decision-making and will be elaborated on in the next section (Guilherme, 2024).

Finally, intelligent automation refers to the combination of task automation, process automation, and RPA, along with the integration of artificial intelligence and data analytics, allowing for the automation of more sophisticated tasks that include those requiring complex decision-making (Guilherme, 2024).

2.2.2 Benefits and Challenges of Process Automation

Process automation offers unmatched benefits in terms of efficiency, accuracy and innovation. However, it stands as a double-edged sword that poses challenges relating to implementation and integration. It is important to explore these benefits and challenges to grasp a better understanding of process automation.

The implementation of automation in business processes can significantly lower labour and overhead costs. Companies have the potential to save money and enhance their profit margins by utilising automation for tasks like data entry and document processing (Dealhub, 2023). According to Cameron (n.d.), automation represents a sensible strategy for managing and reducing expenses. He further mentioned that the most advantageous prospect for a business lies in systematically cutting costs while simultaneously enhancing customer services. Additionally, Balaraman (2024) emphasises that while the upfront investment in automation can be quite high, the long-term savings are considerable. Automation allows machines to perform tasks at a lower cost, reducing labour expenses and boosting overall operational efficiency.

Dealhub (2023) highlights that the likelihood of human error can be significantly reduced with automation, leading to output that is more accurate and consistent, this is particularly valuable in tasks where minor errors can have detrimental impacts on the business, their customers and their overall retention rate, tasks such as data entry, financial processes and order fulfilment. In addition, Cameron (n.d.) explains that automation thrives in operations like batch processing, ensuring that jobs are completed in the correct order without running out of sequence, missing or delaying. In essence, automation simplifies the way a task is being executed, thereby eliminating the risk of human error and reducing the time to complete such a task. Costa et al. (2022) added that machines can operate continuously without breaks, allowing businesses to function seamlessly around the clock with improved efficiency.

Another benefit of automation, pinpointed by Dealhub (2023), is that automation ensures that organisations are operating with predefined rules that conform with regulations and industry standards. Automated systems also have the capability to generate audit trails, making it easier for businesses to demonstrate their compliance to auditors and regulators in their industry.

Thomson (2023) asserts that process automation can enable organisations to expand their business operation without the need to increase their workforce. Human workers can focus on more task that requires complex decision-making, apply their creativity and bring innovation while machines and bots handle the repetitive and routine tasks in the organisation.

Automation allows for proper organisation and streamlining of data; this has helped organisations collect, analyse and interpret data quickly and accurately. As a result of this, insights are always available for swift decision-making in the organisation, which has led to improved revenue, customer satisfaction and sustained competitive advantage (Dealhub, 2023).

Process automation brings about increased efficiency; for most organisations, it has enabled them to process higher volumes of work with the same or fewer resources, reducing and saving costs while increasing the level of productivity. Many IT workers and professionals have attributed 10-50 % of time savings to process automation (Dealhub, 2023).

Process automation provides a wide range of advantages, as discussed in the earlier section; nonetheless, companies encounter significant challenges when automating their processes. According to Abdel Malak (2023), the implementation of process automation can be quite complex due to the human factors involved at each stage. He emphasises that successful execution necessitates thorough planning and preparation. A variety of considerations must be taken into account before starting any automation initiative. Both

Abdel Malak (2023) and BEM (2022) identify several obstacles faced by organisations during automation, which are summarised below:

Abdel Malak (2023) pointed out that an increasing number of organisations are embracing automation in response to the growing importance of this trend in the current business environment, automating tasks such as handling emails, entering data, and scheduling meetings. However, managers struggle to identify which processes are most appropriate for automation; this challenge stems from their understanding of the current manual procedures within a company, along with the need to direct resources toward the most productive areas. Additionally, BEM (2022) noted that businesses often utilise a one-size-fits-all approach to automation, which is not an effective strategy. The author describes blanket automation as the reliance on software and robots to oversee processes, thereby substituting human workers to reduce operational expenditures. BEM concluded that companies must not only determine which processes to automate but also make thoughtful decisions regarding the right processes to automate to realise greater returns on investment and create value.

For any organisation to fully automate a process, it must be able to integrate and align existing business line applications to complete the process cycle. However, most of the legacy systems do not allow for integration (Abdel Malak, 2023). Furthermore, BEM (2022) added that switching from a legacy to a modern system is a daunting challenge for several reasons, as these systems have been utilised by the organisation for a long time, the author highlighted that employee familiarity with older systems as a significant reason and they would require retraining to familiarise with the new business process.

Automation of processes that are directly tied to regulation, policies and controls are subject to frequent changes, and these processes require careful analysis and adjustment. This ensures that automation aligns with the needs of the business while the business remains compliant with regulatory requirements; large organisations have observed that automation can sometimes conflict with regulatory and business constraints (BEM, 2002).

The implementation of process automation usually comes with the issue of data transfer; organisations that have existed for a long time will have an enormous amount of physical that needs to be transferred to start the automation process. However, the transfer process can be daunting, lengthy and cost-consuming for an organisation. Coupled with the fact that human error can occur due to the amount of work required to complete the automation process fully and the higher rate of errors made during this process, the more expensive and time-consuming it will be to correct the issues (BEM, 2022).

BEM (2022) explains that one of the other challenges organisations face is that they fail to optimise their processes before automating them. Optimisation of the process can help the organisation to improve processes and eliminate waste, but this challenge can

deteriorate in a situation where an organisation relies on the automation software to carry out the process optimisation. This puts a strain on software systems that are specifically designed to optimise processes. Organisations must ensure that the optimisation of processes is carried out independently to save time, resources and personnel's mental effort.

The organisation is also experiencing a lack of skilled workers who have the necessary technical expertise to implement and enhance process automation effectively. As more organisations adopt automation technologies, there is a growing need for individuals proficient in RPA, machine learning, and data analytics. Additionally, it is essential for the organisation to provide proper training to personnel, allowing them to comprehend the new system and achieve the desired outcomes. (Abdel Malak, 2023).

Process automation is the best approach organisations can take to automate their business processes. However, not all organisations can afford the cost associated with automation, these present difficulties especially for smaller organisations with limited budgets. It is also important that the right software is selected when implementing RPA, as this would ensure the flexibility and adaptability required to complete tasks. Personnel in the organisation must also be adequately trained to use RPA. In conclusion, Lack of funding may prevent many businesses from starting the path toward digital transformation, which will limit their ability to compete (Abdel Malak, 2023).

2.2.3 Process Automation Implementation Strategies

Notarize (2022) explains that process automation strategy can help organizations gain a competitive advantage in terms of saving cost, increasing efficiency and also enhancing their customer's overall experience, technology is not the only factor involved when it comes to the design of a viable automation strategy, some managerial and organization challenges can hinder the success of automation strategy, this fact is established according to the survey carried out by Blue Prism in conjunction with Knowledge Capital Partner Survey. Furthermore, Notarize (2022) argued that process automation can only be successful when there is an alignment of technological processes and an organizational culture ensuring effective integration of both digital and intelligent automation, the author provides the essential factors that must be in place to design an effective automation strategy.

The very first factor to consider is the organizational goal, Notarize (2022) explains that organization must define their vision and goal as this would help identify how automation can help in achieving their set objective, and questions listed below will be explored when defining the organizational vision:

What value was the organization founded on? It is pertinent to understand the core values of the organization as this provides insight into its fundamental principles, this helps in

aligning automation initiatives with the organization foundational values, ensuring that the automation strategy supports and reinforces the organization's philosophy.

What specific business challenge is the organization trying to address? It is essential to pinpoint the precise issues that the organization seeks to resolve through automation. These challenges may include gaps in efficiency, cost-related inefficiencies, or other difficulties within existing processes. The automation approach should specifically focus on these issues to provide measurable benefits.

What achievements are we aiming for within a year? Establishing clear and quantifiable objectives for the short-term aids in evaluating the effectiveness of the automation plan. Success indicators should align with the broader organizational vision, creating a framework for tracking progress and ensuring that automation initiatives lead to the intended results.

Optimizing Business Processes: Business processes must be regularly assessed and examined to ensure ongoing efficiency, allowing for the identification of effective practices and areas for improvement. Feedback on new processes should be collected for consideration, and a clear plan should be developed to enable team members to utilize these processes effectively (Notarize, 2022).

Automated Governance: Effective governance is critical as it assists organizations in identifying the most suitable automated technologies, enabling them to monitor performance, enhance reliability, and resolve issues related to process implementation, while also fostering employee trust in new workflows (Notarize, 2022).

Data Governance: A Data governance program sets up internal standards via data policies that outline how data is collected, maintained, and processed, all while safeguarding its integrity and security. The dependability of data has become increasingly crucial due to heightened focus on emerging regulations concerning data privacy.

Supportive Tools: Tools designed for supportive automation testing contribute to the upkeep of automated programs, ensuring their ongoing effectiveness. These tools enable organizations to maintain a competitive edge and avoid pitfalls by utilizing pre-written scripts to boost application success rates (Notarize, 2022).

Investment in Employee Hiring and Training: According to Notarize (2022), the effectiveness of an automation strategy largely hinges on the team responsible for its management. Developing and training support personnel, IT teams, and data analysts is vital for rolling out an automation strategy that aligns with the organization's objectives and guarantees enduring success.

2.2.4 Success Factors for Process Automation

Critical success factors (CSF) as defined by Rockart (1979) are the limited number of areas that assures successful performance if the result derived from these areas are satisfactory. Trkman (2010) categorized CSF into three main theories which are CSF based on contingency theory, dynamic capabilities and task technology fit theory.

CSFs based on contingency theory, Hung (2006) highlights the importance of BPM and organizational strategy being strategically aligned, the author explained that the strategic framework of the BPM program must be critically analysed and understood to fully maximize the value of improving business processes. Also, IT alignment to business strategy is very key and essential to achieve the successful implementation of RPA. Duh et al. (2006) assert that IT investment in an organization is dependent on the organization's strategy and other organizational resources that relate to IT in the organization's external environment. Also, it is pertinent to note that a reengineering of core processes that is tuned to customers' perspective is required to maximize its benefits as IT itself does not bring about any competitive advantage (Terziovski et al., 2003), this magnifies the fact an organization's environment is a depending factor that determines the level of IT investment in the organization. Also, Performance management is also essential for the successful implementation of process automation, new processes must be evaluated and measured against the process they replace to determine their effectiveness, this measurement must include time, costs, productivity level, quality and capital in order to have effective results. Another factor for consideration is the employee's level of specialization, the balance between a specialist and generalist personnel for business processes, specialist personnel is only capable of performing only on task while generalist personnel can handle multiple tasks (Mulyar & van der Aalst, 2005). Having generalist personnel makes the process more flexible (Reijers & Mansar, 2005). Hence, it is crucial to find the optimal ratio of specialist and generalist workers (Mulyar & van der Aalst, 2005).

CSFs based on dynamic capabilities highlight that carrying out thorough analyses of organizational change and changes in organizational structure constitute a part of BPM (Guha & Kettinger, 1993). The focus of BPM should essentially be customer oriented that breaks silos and horizontal end-to-end processes (Trkman, 2010). Also, the Appointment of a process owner is another factor of dynamic capabilities meaning that an owner should be assigned to each process who monitors and reviews the process's performance as well as its continuous improvement (Lee & Dale, 1998). In order for the processes to succeed, the process ownership role must be made permanent with defined authority and responsibility of creating the process, measuring the process performance, and training line workers that interact with the process (Hammer & Stanton, 1999). Furthermore, the success of BPM depends on the success of the proposed changes in an organization which is why employees must be sensitized and trained to understand the changes and work according to its requirements, a proper system must be created with

the integration of quality and process-oriented improvement approach to support continuous improvement system.

CSFs based on task technology fit focuses on key areas such as the standardization of process, informatization, automation and training and empowerment of employees to achieve sustained success (Trkman, 2010).

2.3 Robotic Process Automation

This chapter provides in-depth theoretical literature on RPA which includes the definition, different types of RPA, RPA roadmap and detailed overview of RPA implementation in any organization, implementation strategies and challenges.

2.3.1 Definition

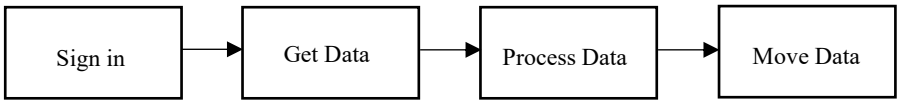
RPA is a technology based on software that allows companies to automate repetitive and routine tasks by mimicking human interactions with digital systems through programmed robots, thereby improving business processes (Lu et al., 2017). These bots are designed to take over routine and repetitive tasks, enabling employees to concentrate more on complex tasks that require critical thinking and decision-making (Aguirre and Rodriguez, 2017). It is essential to note that RPA integrates smoothly with existing organizational systems, rather than replacing or overriding them; it serves as an additional layer that interacts with those systems without necessitating any modifications (Lacity and Willcocks, 2015). It is focused solely on executing tasks for which it has been programmed, making its integration very straightforward. Lu et al. (2017) noted that RPA interacts with a system in the same way that human staff would, by clicking, typing, and navigating interfaces; the key difference is that RPA completes the task with enhanced efficiency. Moreover, when human input is necessary, personnel can take over tasks initially designated for RPA bots (Asaitiani and Penttinen, 2016). RPA has access to systems just like human staff, using its own unique login credentials.

Jovanovic et al. (2018) identified several common tasks that organizations automate using RPA, these tasks include sending emails, launching applications, and transferring data from one system to another using copying and paste functions. Lacity et al. (2015) also explored processes that are suitable for automation, he gave the example of moving data between emails, spreadsheet software and enterprise systems like ERP or CRM. A key point to note is that RPA is particularly useful in cases where software applications lack integrated application programming interfaces, and interaction between systems can only occur through front-end users which can be human workers or RPA bots (Asatiani & Penttinen 2016). Syed et al. (2020) later analysed thirty research papers to outline the key characteristics of tasks best suited for RPA implementation.

- Follows set rules
- Processes high volume of data
- Well defined and refined process
- Easy to achieve and show the impact
- Utilizes organized digital data
- Highly manual
- Transactional
- Standardized
- Low levels of exception handling
- Highly repetitive
- Major simple task with little difficulty
- Clearly defined steps
- Interacts with different systems

One example where an RPA would be suitable is when an employer logs in to one system, gathering data and processing them using predefined rules, then uploading this data into another system (Lacity & Willcocks, 2015). This process is illustrated in Figure 2.

Figure 2: A Typical RPA Process



Source: Adapted from Lacity & Willock (2015)

2.3.2 Types of Robotic Process Automation

There are three different types of RPA namely attended RPA, unattended RPA and hybrid RPA.

Attended RPA which is also known as Robotics Desktop Automation (RDA) based on its ability to operate as a software assistant (Col, 2017), it essentially utilizes a bot as personnel assistant for human personnel that uses the local desktop to carry out work activities, the bot is then commanded to handle task of the human personnel, the robot operate after command has been given by the personnel, it can log into a system, searches for data/information, identify relevant data and sends the output to the human personnel who then carries out the assessment of the bot's output or result, if the data provided by the bots is deemed accurate, it will be moved on to the next process which can be to generate a new report or to update an old report(Automation Anywhere, 2019). In addition, Col (2017) explains that attended RPA is utilized to perform a static and routinized task in the workstation in the place of the human employee. However, if there is a need for human intelligence or input in such a task, control can easily be given back

to the human personnel by the robot at the workstation, the author stresses that attended RPA is suitable for tasks that cannot be fully automated and which are mostly used in front office task i.e. task relating to the activities that involve customer service (Leibowitz & Kakhandiki 2018). The disadvantage of attended RPA is that the robot completely takes over the computer, and the human employee would not be able to perform any task on it as long as the bot is in control, this is however not a challenge as the robot will execute the task faster and more accurate than the human personnel (Shafiki, 2019).

Unattended RPA operates differently from attended RPA, it is designed to carry out tasks for multiple human workers which means that it is a non-personal assistant bot (Shafiki, 2019). Col (2017) describes unattended RPA as a software bot that operates independently, it has the capability to retrieve required information from applications, apply rules that are set for data, efficiently carry out tasks and execute processes to generate new material and integrate the generated knowledge into the application through user interfaces (UIs) or application program interface (APIs). However, in a situation where it is required or where error occurs, the human supervisors who oversee the bot operation can intervene and take control (Col, 2017). It is pertinent to note that an unattended RPA bot operates in a virtual machine as against a local desktop which enables it to perform remote execution, monitor processes, conform to standard schedule and provide support where necessary while fully taking over the computer (Shafiki, 2019).

Hybrid RPA combines both attended and unattended RPA, and it is primarily used for large-scale processes that consist of two main elements: decision-making and automation. For example, human operators start the attended robot at the onset of the process, after which the unattended robots are activated automatically to perform the following steps or manage the entire automated tasks. In certain situations, the unattended robots commence the operation based on a predetermined schedule and then pause at the stage of the process that necessitates human input, which is subsequently handled by the attended robots once prompted by the unattended robots (Shafiki, 2019).

2.3.3 Robotic Process Automation Tools

RPA tools are software applications that enable tasks to be configured for automation, with automation gaining prominence in the IT world, there are now several providers of RPA software with the prevalent ones being UiPath and Blue Prism amongst the many RPA tools in the automation market. The mentioned RPA tool is considered to be the leading tool in the RPA market based on the survey carried out by Gartner (2023), who categorise RPA providers in their annual magic quadrant report based on their position as challengers, leaders, visionaries and niche providers within the RPA industry.

Figure 3: Magic Quadrant for RPA

Source: Gartner (2023)

Based on the report carried out by Gartner (2023), UiPath and Blue Prism are the most sought-after automation tools in the industry; the dominance of UiPath is attributed to their robust customer service and how seamlessly the automation software design, scale and integration RPA programs, while Blue Prism is recognised based on its vast and strong product portfolio making it useful for integrated machine learning. However, it is considered to be less user-friendly when compared to other RPA software (Ray et al., 2020)

2.3.3.1 UiPath

UiPath is an enterprise automation provider founded in Romania in 2005, which specialises in providing automation solutions that help streamline business processes. The company's vision is to create a fully automation enterprise that allows businesses to take advantage of the capabilities of automation to enhance their creativity and maximise the full potential of their human resources. UiPath offers a comprehensive automation platform by integrating leading robotic process automation (RPA) solutions with strong capabilities that can enable organisations to transform their business digitally (UiPath, 2023).

Kaur (2023) highlights that UiPath is widely used by organisations worldwide to streamline and automate their business processes. It is especially useful in automating tasks that are considered routinised, which consumes a significant amount of an employee's daily schedule while ensuring that such tasks are carried out accurately and

efficiently without errors. UiPath is preferred by many organisations because of its code-free feature, its easy-to-use drag-and-drop capabilities, and user-friendliness. The platform is built on vb.net scripting, which allows its users to design automation workflow visually using diagrams. Additionally, it supports end-to-end automation, also known as hyper-automation, making it one of the leading RPA providers for automating rule-based and repetitive tasks across various industries.

UiPath is made up of three main components, namely the UiPath studio, UiPath Robot and UiPath Orchestrator. The UiPath studio requires no technical or high-end programming skills as it is very easy to use; its drag-and-drop capabilities allow for automation workflow to be designed visually alongside its built-in recorder (Kaur, 2023). The UiPath Robot can function independently without the intervention of human supervision, the robots are easy to train, they mimic human interaction with a digital interface, and they also have the capability to locally execute workflow and instruction through an orchestrator, in summary, the robot can be viewed as a virtual assistant to personnel design to work as a unit while the robot provides progress update which is dependent on the level of human involvement required, UiPath robots can be categorised as either attended or unattended (Kaur, 2023).

UiPath Orchestrator is a web-based application designed to help the user plan, coordinate, supervise and manage robots and studio processes; it serves as a library where all activities of the robots are stored, activities such as reusable components, assets and processes. Also, it also allows users to manage, control and monitor robots (Kaur, 2023).

2.3.3.2 Blue Prism

Blue Prism was founded by a group of automation experts in 2001. They realised that there was a need for a different kind of automation software with the capabilities of automating manual and repetitive tasks in business processes, so the company released the very first version of the software in 2012, featuring drag and drop interface that enables the user to automate their processes. As a result, Blue Prism is regarded as one of the leading automation tools with a presence in 170 countries. It has the capabilities to automate different kinds of file formats such as PDF, CSV, and Excel, amongst others, and its engine also supports the automation of software development in tools like Java, mainframe and Microsoft Applications. Blue Prism platform is being used by large organisations to automate their business process (Kaur, 2023).

Blue Prism also consist of various components, as described by Kaur (2023), which include the object studio, process studio and control room. The object studio enables users and IT experts to develop components that can be reused, which will serve as a building block for the business process by displaying current applications, while Blue Prism serves as the robotic user of the displayed application. Object studio is basically used to create the essential activities of the system, which serve as the basis of the process; it works like

a design canvas that enables the programming of a bot for the essential activities, allowing for elements to operate, carry out quick models and validate the targeted desktop application.

Process Studio utilises the reusable components which enable users or IT experts to design, create, modify and test processes; the process layer, which is the most advanced feature of the Blue Prism architecture, allows actions to be scheduled and managed as the library containing the business objects grows. It allows for sequencing and testing of variables, control loops, object calls and business logic in a visible business flow, which has an interface that is similar to Object Studio. In Blue Prism, Processes are similar to software procedures in such a way that they can automate rule-based processes and business logic and also invoke objects and operations to run applications (Kaur, 2023).

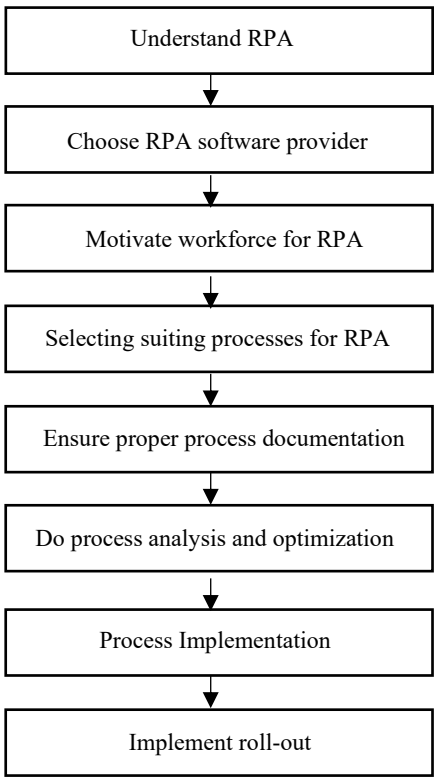
The control room enables businesses and IT experts to schedule, execute and manage processes. The Blue Prism control room allows the platform managers to monitor and assess the status of the production environment's associated runtime. Additionally, the interface also enables automatic process scheduling, manual process start and stop, as well as comprehensive management information, which delves into Blue Prism queues (Kaur, 2023).

2.3.4 Robotics Process Automation Roadmap

The implementation of any new technology in any organisation requires careful planning to ease the adoption process; as a result, for an organisation to fully integrate RPA, there is a sequence of actions and steps that must be considered; this step makes up the RPA roadmap. Fortra (2023) describes the RPA roadmap as a high-level implementation plan that specifies objectives and outlines the steps, milestones, and periodic deadlines to be adhered to by the team when implementing RPA within their organisation. Furthermore, Fortra explains that the RPA roadmap must be dynamic and capable of adapting as the organisation progresses through the different stages of the roadmap. Koch and Fedtke (2020) outline a number of important steps (figure 4) that an organisation must take during the course of introducing RPA in their business. The sequence of this process may vary depending on the kind of organisation.

The first step of the process is to ensure that understanding of what RPA entails is well established by the RPA team. At this stage, it is important for the RPA team to know all the processes in the organisation as well as be knowledgeable of how all the processes work; this would enable them to easily pinpoint processes that are very suitable for automation while carrying out a process evaluation, the evaluation process must list out the characteristic of what processes can be considered for automation (Kleehaupt-Roither & Unger, 2018). Authors in the field of RPA have identified the following criteria for suitable processes.

Figure 4: RPA Roadmap



Source: Adapted from Koch & Fedtke (2020)

It is pertinent to ensure that any process that is selected for automation must be a support process and not a core process that requires complex decision-making or is extremely technical in nature (Langmann & Turi, 2020). Also, it must be ensured that data associated with the process must be readable digitally to ensure the seamless operation of the robots. For instance, if the robot is utilising data from an email attachment, it cannot be handwritten or in an image format, which is why personnel must ensure that the data required for the process are readable (Langmann & Turi, 2020).

Lastly, RPA is best suited for processes that are considered to be stable in an organisation. In other words, these processes must be well established and are not prone to any sudden change. Examples of such processes can be simple rule-based activities that utilise software applications like Excel, SAP and emails. Processes that involve complex mathematical calculations can also be automated as this type of process is somewhat difficult for humans to execute (Koch & Fedtke, 2020).

The above criterion can be seen as either relevant or not, depending on the organisation and the processes. However, the criterion can be used to evaluate processes suitable for RPA (Langmann & Turi, 2020).

The second step is to select an RPA software provider. After the understanding of the technology has been established, it is pertinent to identify the relevant providers in the RPA market, and one of the best ways to do this is to use the magic quadrants. This can help organisations make informed decisions when selecting an RPA provider. The magic quadrant is illustrated in Figure 3.

It is essential to motivate and educate employees on the importance of RPA since it may be possible that employees perceive the bots as a threat as they will be taking over the employee's work, making them outdated (Asatiani & Penttinen, 2016). It is, however, important to assure employees that RPA will ease the burden of carrying out repetitive and rule-based tasks and allow more time for more productive tasks.

The processes considered for RPA should follow the criterion in the first step; the aim of the subsequent steps is to determine the processes that are RPA-suitable (Jimenez et al., 2019).

The next step is to ensure proper process documentation, the major reason being that it will serve as a basis for RPA bot development; proper documentation ensures that backup is available in case a bot fails or malfunctions; such processes can be carried out manually based on the documentation (Koch & Fedtke, 2020).

Jimenez et al. (2019) emphasise the importance of carrying out process reengineering by an organisation alongside their personnel and, at the same time, involving process experts in the reengineering process; the step is highly crucial because automating a process that is poorly structured would prove ineffective. Additionally, organisations should consider exploring other automation methods to ascertain whether or not the RPA is the best fit for such processes; if RPA is deemed to be the best approach, every detail relating to the process, including data flow, system interaction and so on must be structure in a way that they align with the capabilities of RPA.

The programming of the selected RPA software is initiated in this step; the decision on whether the bots will operate on the computer of the employee or on a virtual machine is made, and relevant system rights will be granted to the bots. Also, tests will be carried out on the developed automation to detect errors; the testing will be done continuously since RPA bots are volatile (Jimenez et al., 2019).

The last and final step is to implement rollout and communicate RPA guidelines. The criteria for processes that should be omitted and those that are appropriate for automation must be spelt out in detail in these guidelines (Koch & Fedtke, 2020). Also the guidelines should also specify the duties and obligations of staff members who create and use RPA bots. In order to maintain efficiency over time, they also need to create a maintenance plan, a testing strategy, and a user-rights framework that specifies access levels. The guidelines are essential because they stop companies from using RPA without enough

supervision, a behaviour known as "shadow IT," in which unapproved automation gets under established governance procedures (Koch & Fedtke, 2020).

2.3.5 Benefits and Challenges of Robotic Process Automation

According to Ostdick (2016), It is not only important to consider the value proposition of any new technology but also to recognise the successful implementation of the ultimate performance of such technology within an organisation; Ostdick explains that RPA is not an exception to this fact as it provides both compelling benefits and implementation challenges to new users.

RPA has the capability to function on any platform and is very interoperable and non-invasive (Lacity & Willcocks, 2016). In addition, Ostdick (2016) explains that organisations can implement RPA without needing to make any changes to their existing systems as it functions exactly like a human user. This allows organisations to implement RPA in a non-interruptive way as well as eliminating the need for constant IT involvement and the requirement that employee possesses programming skills. Organisations can deploy a large number of software bots at minimal cost due to the flexibility and scalability of RPA (Dilla et al., 2017). RPA systems contain a large number of reusable business components, which enable them to facilitate quick development (Eddy, 2015). Even with limited or no programming experience, the components are very easy to create, and the volume of tasks that can be automated is unrestricted (Imanuel, 2018). It has a library that gathers information on workflow, which becomes a knowledge base for additional process improvement (Taulli, 2020).

RPA has the capability to significantly reduce processing time and improve accuracy (Connolly, 2018); this improvement in speed comes from the standardisation of processes during RPA implementation, as well as the reduction of human errors due to software bots taking over repetitive tasks. Additionally, Padamkar (2023) highlights that RPA bots are suitable for a variety of processes due to their consistency and adaptability; bots execute tasks faster and more accurately when compared to human users, in which they accurately mimic human actions, thereby saving time and valuable human resources.

If organisations allow for a collaborative atmosphere for both software robots and employees to work side by side, RPA can significantly boost the morale of employees and improve their overall productivity as it automates tasks that are repetitive and mundane, allowing employees to focus more on engaging and higher value task such as client interaction, problem-solving, and decision making (Dilla et al., 2015). A positive experience with RPA will not only boost employee job satisfaction but also reduce employee turnover, which helps organisations reduce recruitment and training costs.

RPA bots are designed to adhere to stringent compliance standards due to their highly controlled and structured nature. This is achieved by ensuring that bots are configured in

line with the proper documentation that was developed in the implementation stage (Pedamkar, 2023). Moreover, RPA also helps with bridging data gaps that exist in various sources while maintaining a detailed record of all actions that are executed throughout the automation process. This comprehensive documentation enables employees to identify and manage any compliance issue effectively while also carrying out regular reviews to ensure consistency (Ostdick, 2016).

RPA's capabilities allow organisations to deliver high-quality and timely services to their customers by automating repetitive tasks, which gives the employees more time to focus on customer service and other important responsibilities (Ostdick, 2016). With the integration of a centralised management platform, organisations can easily remotely design, monitor, control, schedule, and deploy RPA robots seamlessly. Since automation rules can contain specific requirements, RPA can, through this, enhance governance in order to manage processes in the organisation better and more effectively. Moreover, RPA allows for the combination of auditing and analytics within a single system, ensuring that data input is well-tracked and transparent. Also, a high level of security is reinforced by allowing software bots to be managed through a remote server control, maintaining strict compliance and data protection standards.

RPA can bring about an increase in productivity; human employees can take several days to complete certain administrative tasks. However, RPA bots can perform those tasks in a matter of minutes, which in turn leads to an increase in productivity; this does not mean that RPA will take over human jobs. Instead, it functions as a digital assistant, which supports employees in completing their work faster and more effectively (Alexis, 2023).

RPA software bots, unlike human employees, operate around the clock; they handle repetitive tasks more efficiently than human employees. Human errors are greatly reduced with the implementation of an RPA software bot, and this saves costs for the organisation and allows the human employee to spend more time on value-driven tasks (Alexis, 2023).

Alexis (2023) opined that cybersecurity and data privacy are major concerns for many large organisations, particularly those operating in industries that are highly regulated. RPA solutions play an important role in improving security by minimising the number of human employees who handle sensitive data, thereby reducing the possibility of data breaches and leaks. Furthermore, RPA can help provide added security, preventing unauthorised access by automatically initiating account logout and enforcing two-factor authentication. These security measures ensure that only personnel with authorisation can access systems that are critical, and this further strengthens the organisation's data protection efforts.

RPA is an essential tool that can aid the growth and expansion of any organisation by increasing their task capacity, and with better quality output, demand from the organisation will likely increase. However, with the use of RPA implementation best

practices, organisations can ensure they have optimised business processes that can scale across entire workflows, connecting systems, departments and people (Alexis, 2023).

Challenges relating to RPA are as follows:

Arjun (2023) highlights that the conventional rule-based RPA tool cannot fully automate every step in a process; some steps in a process may require the integration of machine learning algorithms and optical character engines (OCR) to handle more complex and unstructured data. However, integrating this advanced technology will lead to organisations incurring more cost of implementation, which makes the overall cost of implementation more expensive.

Abdel Malak (2023) opined that the most common challenge of RPA is the implementation cost. The author explains that while the upfront cost for implementation can be significantly high, RPA can provide a return on investment (ROI) in a relatively short period of time, and there are a number of ways to reduce the cost of RPA, including the utilisation of open-source solutions and leveraging on existing infrastructure.

The organisation often struggles with scalability when implementing RPA; this is primarily because it overlooks the need for its system to support large amounts of RPA bots to handle several processes at the same time (Anastasia, 2022). Challenges relating to scalability can also arise as a result of regulatory updates or internal system changes, which makes it difficult to expand automation efforts in the organisation effectively.

To ensure the smooth and seamless operation of RPA bots, organisations must follow a regular RPA maintenance schedule; otherwise, system performance may decline over time, which leads to numerous technical issues. Additionally, reliable technical support must be ensured so as to prevent any potential errors and disruptions in automated processes (Anastasia, 2022)

Another common mistake on the part of most organisations is that they fail to assess the existing systems before deploying RPA. If the existing systems are not flexible, outdated or slow, RPA may not deliver the desired result and could even result in more inefficiencies (Anastasia, 2022).

Furthermore, since RPA bots handle internal tasks and also have access to sensitive data, it is essential for organisations to establish proper access management and data validation; if this is not properly approached, it can expose organisations to data leaks and system vulnerabilities. As a result, security management is regarded as a top priority in RPA implementation (Anastasia, 2022).

Implementing RPA requires a thorough and comprehensive analysis of existing business processes in order to determine which tasks are best suited for automation. However, several factors play a key role in the evaluation process, such as rule-based structure, task

frequency and task predictability; this initial analysis of processes can be time-consuming and may involve complex decision-making, especially when dealing with processes that have a variety of needs (Arjun, 2023).

While RPA has the capabilities to enhance efficiency significantly, some critical business processes require uninterrupted operation; like any other technology, RPA systems also need to be regularly updated, maintained and troubleshoot, which may result in temporary downtime of operations. However, in cases where minor downtime cannot be tolerated, it may not be practical to rely solely on RPA for such processes, which would mean that the organisation would need to look for other backup alternatives or hybrid automation approaches (Anastasia, 2022).

Business processes are not static in nature; they tend to evolve as a result of regulatory changes, organisation restructuring or workflow optimisation. When processes change based on these factors, it is expected that the automated workflow must be updated accordingly; this requires an understanding of how RPA codes and logic work, which poses a challenge for non-technical users who may struggle to adapt the system without any specialised knowledge or IT support (Abdel Malak, 2023).

Lastly, configuring and maintaining RPA solutions is not always straightforward; tasks such as script development, workflow design and troubleshooting often require programming expertise. Organisations without personnel that is skilled in automation technologies may face great difficulties in sustaining their RPA systems. As a result, organisations may need to invest in technical training for their personnel to hire RPA experts, which would add to the overall cost of RPA implementation (Anastasia, 2022).

3 ROBOTIC PROCESS AUTOMATION IMPLEMENTATION

Every organisation today is evaluating the benefits of integrating Robotic Process Automation (RPA) into their operations. However, for successful RPA implementation within an organisation, having a well-established and reliable methodology is crucial. The goal of this approach should be to create a digital, hands-free environment with a strategic focus on optimising the overall cost of serving customers. To actualise this vision, a standardised approach is necessary for implementation. It becomes tactically imperative to create and rigorously follow a consumption framework to ensure the ability to commit to and realise the benefits.

3.1 Pre-Implementation Steps for Robotic Process Automation Deployment

Sethi (2022) explains that there is no definite and defined approach to RPA implementation, the approach of implementation will be determined based on the kind of industries and specifically on an organization's operation, the author however highlights

certain steps that can be tailored to specific organization's need regarding RPA implementation:

Sethi (2022) highlights that implementing RPA requires a structured approach to ensure that RPA aligns with the overall objective of the business. The first step in this process is to clearly define the current business problem or the opportunities the organization aims to address. Organizations must ask critical and important questions such as "What are the primary goals for implementing RPA? Which challenges should automation resolve? Answering these questions would provide clarity and help in identifying how RPA can be effectively implemented within business operations (Sethi, 2022).

Once the problem has been well defined, the next step is to identify business processes that are best suited for automation, it is essential to note that not every task in an organization can or should be automated, certain processes are best handled by humans due to their complex nature or the need for decision making, the organization must ensure that workflows are closely analyses in order to determine the task the meets the criteria for automation (Sethi, 2022)

After the identification of tasks that meet automation requirements, an assessment of determining the feasibility of automation is then carried out, this feasibility evaluation will consider factors like task complexities, data requirements, regulatory constraints and the overall system integration requirement (Sethi, 2022), the author added that automating complex processes that requires extensive data requirement may not be ideal for automation, as this could lead to additional risks or inefficiencies instead of the desired improvements.

Before moving forward with RPA implementation, organizations must develop a business case for the adoption, which essentially involves engaging key stakeholders across various departments in the organization in order to assess the cost implication and the expected benefits of investing in RPA, a well-defined business case would outline the return on investment (ROI), its effect of productivity as well as long term cost savings which ensure that decision-makers have a clear understanding of the financial and operational impact of RPA deployment (Sethi, 2022).

The final phase of the planning stage is to create a detailed implementation plan, this plan would define how and when RPA will be integrated into the system, specifying which task will be automated, and who will manage the automation project, the plan will also address the necessary financial, technical and human resources that would be required. Additionally, it will establish a realistic timeline and also consider the potential constraints that may be encountered such as system compatibility, employee training and budget limitations. A well-structured and defined implementation strategy would ensure a smooth transition to automation which increases the chance of RPA adoption being successful in the long run (Sethi, 2022).

Once the planning phase is complete and all the relevant stakeholders have bought into RPA deployment, the next step is the product initiation and development of a proof of concept (POC), At this stage, an RPA centre of excellence (COE) establishes to oversee the implementation and also to ensure that all steps are carried out in compliance with the best practices. The POC serves as a prototype that puts automation theories into action by simulating real-world scenarios before initiating full RPA deployment. This process helps organizations to ascertain and assess the feasibility, functionality and overall effectiveness of RPA solutions before committing to a companywide RPA implementation (Sethi, 2022).

The next phase is the implementation and deployment of software bots, at this stage the software bots are now deployed to commence automation of task while working alongside human personnel, this deployment of RPA solution occurs in three different key stages which are the pre-deployment, deployment and post deployment.

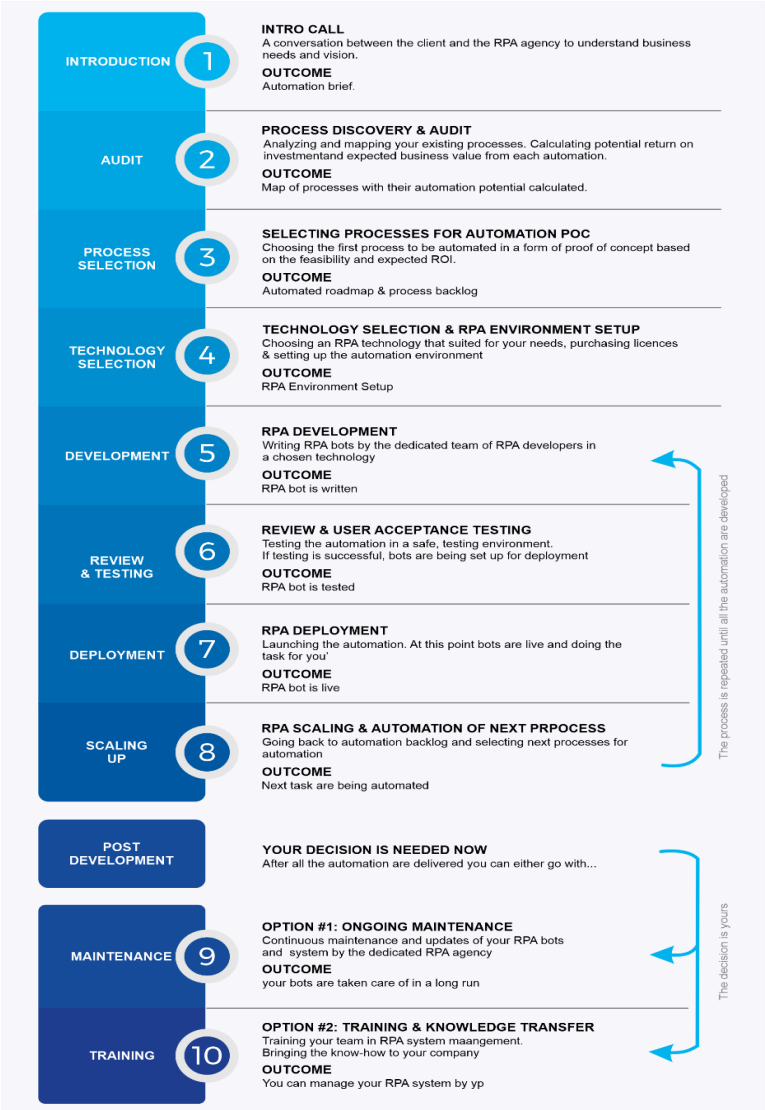
Sethi (2022) highlights that the pre-deployment stage entails the activities that need to take place before the main implementation of RPA which is mainly a pilot test, this test is conducted to evaluate RPA technology in a controlled environment. The RPA engineers analyse the POC performance, identify potential issues and also make necessary adjustments to ensure that the system is functioning with optimal efficiency. Additionally, the integration of RPA solution with existing IT infrastructure is also assessed to ensure its compatibility with critical business applications. This step is highly crucial in preventing any unforeseen system disruption and ensuring a smooth transition from manual to automated processes.

The next stage is the deployment stage, during this stage, RPA bots are designed, tested and deployed into production. It is important to ensure that the automation process aligns with the business goal, as a result of this fact, the selected workflow must be carefully considered to ensure that those workflows after being automated integrate seamlessly with the organization's overall operation. A comprehensive management and monitoring strategy must also be in place to assess the bot's performance, minimize errors and also to address operational challenges. Continuous monitoring during this phase will guarantee that the bots function as intended and deliver the expected result (Sethi, 2022).

The last stage is the post-deployment, at this stage, the RPA bots are live and operational, the main focus of this stage is continuous monitoring of the RPA bots, this is necessary to measure their performances and optimize key processes. KPIs such as accuracy rates, processing speeds and overall system reliability are to be tracked to ensure that the automation meets the expectations of the organization. Also, Regular feedback from employees that interact with the RPA system is crucial as it would help address concern and improve user experience. Additionally, periodic maintenance of the system and updates would ensure that the RPA bot remains aligned with changing business needs and technological advancement (Sethi, 2022).

Radek (2022) outlined an ideal framework for developing and implementing RPA solutions, the author presented a structured approach that would ensure smooth integration. This is depicted in Figure 5 below:

Figure 5: Model RPA Implementation and Development Process



Source: Radek (2022)

An in-depth evaluation of RPA approaches proposed Sethi (2022) and Radek (2022) reveals that both methodologies have similarities in structure as well as execution, while the terminologies used by each author differs, the core steps involved in the RPA implementation process closely align.

Radek's framework starts with an introductory call during which an organization consults with an RPA expert to evaluate the current workflows, identify challenges, and pinpoint potential processes that could benefit from automation. This initial step is crucial as it helps organizations recognize processes that are appropriate for automation and, more

importantly, those that align with business goals, guaranteeing that automation initiatives are thoughtfully and strategically organized (Radek, 2022).

The next phase entails a review of legal, compliance, and audit aspects. During this phase, the RPA team thoroughly examines the legal and regulatory impacts associated with the adoption of RPA to guarantee conformity with industry standards and the organization's internal policies. Once compliance has been confirmed, the identified processes selected for automation undergo a detailed audit to evaluate their feasibility based on anticipated ROI and overall business value.

Once the compliance and feasibility stage are established, organizations then proceed to proof of concept (POC) selection whereby a key process is selected as a pilot for automation which allow stakeholders to observe and evaluate the effectiveness of the RPA bots, if the POC is successful, additional processes will then be added to the automation backlog for future implementation.

The next stage focuses on the selection of the RPA technology and automation environment setup. Based on the identified automation needs, the RPA team recommends a suitable tool for the leading RPA tools in the market, the appropriate licences will be procured while the automation tool is configured to ensure seamless integration with the existing systems.

The development phase follow after the right tool has been selected; the engineers create the automation script with reference to the process definition document (PDD). This is phase is highly critical as involves the scripting aspect, workflow design, and the programming of the bot to execute the selected tasks.

Before the RPA bots are fully deployed, they are still subject to review and user acceptance test, this step involves running the bots in a controlled environment which allows the dedicated testing team and end-users to ascertain the automation effectiveness if any issues are detected upon the testing, the bots are sent back to development for modification and refinement before being approve for live deployment in the main production environment.

Upon successful testing, the deployment phase begins where the bots are deployed and integrated into the production environment. At this point, the employees start working alongside the RPA bots which allows the organization to monitor them in real world performance and modify the system as required.

Finally, Radek (2022) further explains that when RPA scaling and the automation of the next processes are carried out, the PRA developers will return to the backlog and select the next process for automation, this will be done by repeating the above steps. Also, when decisions about maintenance are made, it is important for the organization to determine whether the hired RPA team will be kept overseeing maintenance and ongoing

support, this is essential because systems and databases get updated, and this can sometimes affect bots' performance.

3.2 Robotic Process Automation Implementation

Robotic Process Automation (RPA) implementation involves several practices to ensure successful deployment and integration into an organization's processes. Here are some key practices for RPA implementation:

Clearly define objectives and scope: A well-defined objective serves as the basis for the success of any RPA strategy, Winkens (2021) explains that organization must clearly define and outline the goals they aim to achieve through automation, the objectives must align with the overall business activities and operational needs, in addition, organizations should commence RPA implementation with processes that are best suited for automation, meaning the processes must be highly repetitive and rule-based. By setting this clear expectation at the beginning of RPA adoption, business can focus their attention on areas where automation would have the highest impact while reducing the potential challenges that come with the implementation.

Conduct a process audit: Before automating any process, a thorough process audit must be carried out to evaluate the current workflow, identify inefficiencies and ascertain which processes are suitable for automation. Ranorex (2023) emphasizes that assessing existing processes enables organizations to identify bottlenecks, redundancies and areas that require improvement. Additionally, Star Knowledge (2023) asserts that a well-executed audit provides a structured roadmap required for designing an efficient automated workflow. This approach ensures that automation is applied to the most suitable processes which will maximize the effectiveness of RPA.

Engage stakeholders: A successful RPA implementation is more than just technical deployment, it requires collaboration of every stakeholder of the organization such as the employees, departmental heads and IT personnel, this fosters a holistic understanding of the requirement of automation, challenges and expectations, Ranorex (2023) describes that involving stakeholders ensures alignment, reduces the resistance to RPA adoption and eases the process of implementation, by effectively involving stakeholder, organizations can design automation solutions that address their pain point while maintaining engagement with their workforce.

Optimize processes before automation: one of the common pitfalls of RPA Implementation is that organization tends to automate processes without optimizing them, it is essential that organization streamlines their workflow by eliminating redundant steps, standardizing inputs and outputs and resolving any inefficiencies. Star Knowledge (2023) suggests that applying methodologies such as Lean Six Sigma or other process

improvement methodologies can significantly enhance process efficiency before automation.

Involve IT from the start: the role of the IT department in the implementation of automation solutions cannot be overemphasized, IT teams provide critical insight into system compatibility, infrastructure needs and cybersecurity measures. Star Knowledge (2023) highlights that early IT involvement enables organizations to anticipate and address potential technical challenges that may arise, as well as ensures smooth integration with legacy systems. Engaging IT specialists from the beginning also reduces the risk of security breaches and also reduces operational disruptions during implementation.

Build a scalable RPA architecture: as automation demands grow, organizations must ensure that their RPA framework is scalable and adaptable, a rigid architecture can hinder expansion which makes it difficult to integrate additional automated processes in the future. Star Knowledge (2023) recommends selecting RPA platforms that offer scalability, resilience and flexibility which would allow organization to expand their automation capabilities that align with the organization's objective, a well-structured RPA architecture ensures that automation remains relevant and effective as organizational needs expand and evolve.

Prioritizing security and compliance measures: security and regulatory compliances are highly crucial in RPA development, organization must implement strong data protection measures, access controls and compliance frameworks so as to safeguard sensitive information. Star Knowledge (2023) emphasizes the importance of data encryption, access control, and regular security audits of RPA systems to detect potential risks. By ensuring RPA aligns with industry regulations, organizations can reduce legal and cybersecurity threats while developing trust in automated processes.

Provide comprehensive training and support: To achieve successful RPA implementation, it is crucial to provide comprehensive training and support by equipping employees with the skills required to effectively use RPA technology. Therefore, organizations must invest in structured training programs, practical workshops, and clearly documented resources to facilitate a smooth transition. According to Star Knowledge (2023), creating a dedicated support system to resolve technical issues and offer guidance to staff is essential during the implementation phase. The author also pointed out that this approach can boost employees' confidence in automation and accelerate the overall transition to automated processes.

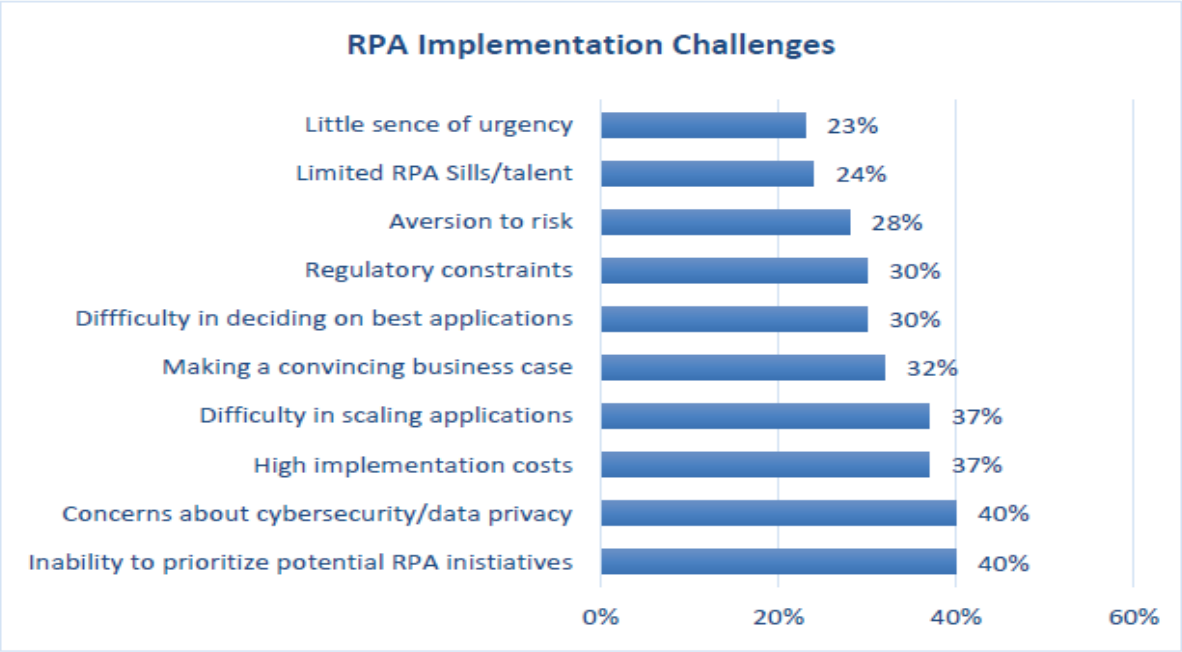
Continuously monitor and optimize: RPA solution is not static, it requires continuous evaluation and enhancement to maximize its impact, an organization must continuously track key performance metrics such as efficiency gain, cost reductions and error rate to ascertain the effectiveness of automation, regular data analysis would help the

organization identify areas that require improvement and ensures that RPA strategies remain in line with changing business needs (Star Knowledge, 2023). By embracing an iterative approach, organizations can improve automation workflows over time to ensure operational effectiveness.

3.3 Robotic Process Automation Implementation Challenges

According to Gao et al. (2019), RPA has gained significant interest across most industries and academia due to its potential to improve business efficiency, the authors highlight that the increasing adoption of RPA is a result of its ability to streamline workflows and reduce human interventions in mundane and repetitive task which has hugely help organizations in improving their overall productivity. Similarly, Nawaz (2019) highlights that RPA reduces organizations' reliance on manual labour for repetitive tasks, allowing them to direct their human resources to more strategic functions. However, there are still so many challenges faced by organizations when implementing RPA, these challenges are pinpointed in the Protiviti global RPA survey 2019.

Figure 6: RPA Implementation Challenges



Source: Protiviti Global Survey Result (2019)

Choi et al. (2021) categorized the RPA implementation challenges shown in figure 6 based on three perspectives which are organizational, technical and financial & regulatory as depicted in table 1:

Table 1: Organizational, Technical, Financial and Regulatory Perspectives

Perspectives	**Challenges**	**Comments**
Organizational Perspective	Prioritizing potential RPA initiatives	Identifying the most suitable process for automation highly important and at the same time challenging, automating the wrong process can lead to implementation failure which make this phase very critical in RPA adoption.
	Aversion to risk	Many organizations are reluctant when it comes to adopting new technologies due to the fear of failure, one way to overcome this is to apply automation in multiple departments in the organization as case studies so as to demonstrate its value.
	Limited RPA skills/talent	Since RPA is relatively a new technology, there is a shortage of skilled RPA professionals, making training of personnel or hiring experts critical for RPA adoption.
	Little sense of urgency	Organizations that do not recognize the need for automation often experience delays in the implementation of RPA.
Technical Perspectives	Cybersecurity/ data privacy	RPA relies on mining user interface data which may include sensitive information which make the security of data highly crucial.
	Scaling applications	RPA solutions must be designed to scale with business growth, if an automated process cannot be scaled as required, it may become a bottleneck rather than a solution for the organization. Therefore, scalable RPA architecture is crucial to prevent this issue.
	Deciding on best applications	Selecting the most suitable application for automation is challenging due to the lack of a standardized benchmarks, organization must outline clear criteria for choosing the best RPA solutions.
Financial and Regulatory	Implementation Costs	The process analysis phase in RPA implementation is time consuming which contributes significantly to the overall cost, strategies to streamline this phase must be put in place to help reduce financial burdens.
	Convincing business Case	Organizations may require use case demonstration to justify the investment on RPA, A well prepared business case with benefit would ensure that management buy into the idea of RPA adoption
	Regulatory constraint	New technologies must comply with industry regulations, which can pose additional challenges. Organizations need to ensure that RPA solutions align with legal and compliance requirements.

Source: Choi et al (2021)

Choi et al. (2021) emphasize that prioritizing RPA initiatives is the foundational step in RPA implementation, the success or failure of RPA implementation is dependent on careful selection of processes for initial deployment. If an organization automate the wrong processes this is not suitable for automation, there is a high risk for failure. Therefore, identifying the scope of automation is a very pertinent issue that must be addressed by organizations as it involves pinpointing processes that are best suited for automation, assessing their feasibility and deciding the order in which the automation will be implemented. Furthermore, since RPA has the capability to automate a wide range of task, organization must carefully assess and evaluate which automated task would bring the highest return on investment, a poorly selected process would not only fail to deliver the expected efficiency but hinders the overall automation strategy of the organization.

Additionally, RPA is known for its low and lightweight code capabilities which makes it implementation relatively faster, its deep integration into business operation means that it has a huge impact on business objectives, data processing and workflows. Organization must understand RPA is not just about automating task, they must recognize that its adoption calls for consideration for business changes, governance and management design, security and compliance, operational stability and exception handling.

3.4 Overcoming Implementation Challenges

RPA has the potential to change business operations by enhancing efficiency, reducing manual labour and significantly improving the productivity of an organization. However, as with any new technology, the implementation of RPA comes with its own set of challenges (Van Brouwershaven, 2023). Organizations must take a proactive and strategic approach to addressing these challenges to ensure a smooth transition to RPA and to maximize the benefit of automation. The author provides the best practices and strategies for overcoming RPA implementation challenges.

Van Brouwershaven (2023) opined that one of the most significant challenges of RPA implementation is the resistance from employees who often fear that automation may lead to them losing their jobs, this may lead to reluctance in accepting or embracing any RPA initiatives proposed by an organisation. To overcome this challenge, organizations must be proactive in communicating the purpose and benefits of automation so as to enable employees to understand that RPA is designed to assist human tasks and not replace them, allowing them to focus on high-value tasks. Van Brouwershaven (2023) explains organizations must consider an inclusive approach in RPA adoption by allowing early involvement of employees in the implementation process, providing necessary training and cultivating a culture of innovation. Encouraging employees to see RPA as a tool that enhances productivity rather than a threat to job security will ensure a smoother and faster RPA adoption.

Another critical challenge organizations face is identifying which business processes are suitable for automation, selecting the wrong processes can massively reduce efficiency and result in failed RPA implementations. To overcome this challenge, organizations must carry out a thorough analysis of their workflows and evaluate factors such as process volume, frequency, complexities and rule-based nature (Van Brouwershaven, 2023). A structured approach would include the involvement of relevant stakeholders to understand their concerns and also identify the areas that would benefit from automation, selecting processes based on their potential to improve efficiency, and carrying out testing through proof of concept. These steps would ensure that RPA is applied to areas where it would have a very high impact which will maximize its effectiveness.

Effective stakeholder management plays an important role in the successful implementation of RPA. However, challenges may arise when stakeholders have different expectations about RPA a lack of clarity about what the automation processes entail, or resist RPA implementation out of concern for job security and disruption to the already established workflow (Van Brouwershaven, 2023). To address this challenge, organizations must ensure open and transparent communication among all stakeholders by clearly stating the objectives, expected benefits and long-term impact of RPA, another key strategy to ensure successful RPA adoption is the creation of a cross-functional team that includes representatives from, business units, IT, operations and finance, this approach ensures that all perspective of each department is considered which allows for better collaboration and alignment with organizational goals. Furthermore, Organizations can demonstrate the value of RPA through pilot projects or proof-of-concepts. By showcasing an example of how automation improves efficiency and reduces manual labour, organizations can ease the concern of stakeholders and gain their support and acceptance of RPA (Van Brouwershaven, 2023).

Successful RPA implementation relies heavily on effective data management and governance. Poor data quality due to inconsistencies or inaccuracies can significantly affect automation efforts which would lead to potential errors (Van Brouwershaven, 2023). Organizations must adopt a structured approach to data management to maximize the benefit of RPA. To achieve this, organizations must set clear data quality standards and ensure data integrity across all systems involved in automation, this includes carrying out a comprehensive assessment of data sources and formats to identify potential inconsistencies before deploying RPA; by implementing data validation and cleansing techniques, organization can improve the reliability of the information processed by RPA bots. Moreover, maintaining strong governance policies is important to safeguarding data security, and privacy and complying with regulatory requirements. Organizations must develop these guidelines to regulate data access, storage and handling to prevent security breaches and ensure compliance with industry regulations. Also, Collaboration with IT and data privacy teams is also critical in addressing potential data challenges. These teams

play a vital role in ensuring the RPA system aligns with cybersecurity measures and organizational policies (Van Brouwershaven, 2023).

RPA implementation is not a one-time implementation but rather an ongoing process that requires continuous monitoring and periodic modification to ensure that it benefit is fully enjoyed. Organizations may face challenges if they fail to evaluate the performance of RPA bots or fail to identify areas of the processes that require further optimization. To address these issues, it is essential for organization to establish systems that monitor and track automation performance, detect inefficiencies and measure key performance indicators. Regular evaluation and adjustment are important to ensure RPA solutions remain aligned with changing business needs. Additionally, seeking feedback from stakeholders and end users will also aid continuous improvement which helps to maintain RPA as a flexible and adaptable solution in a dynamic business environment (Van Brouwershaven, 2023).

Van Brouwershaven (2023) emphasizes that successfully implementing RPA requires a well-structured and proactive approach. Organization must address key challenges such as change management, process selection, stakeholder management, data governance and continuous improvement, by addressing these factors, organization can overcome these challenges and enjoy the benefits of RPA. A well-executed implementation would not only improve operation efficiency but would also ease the automation of future processes, promotion innovation and long-term organizational growth.

4 ROBOTIC PROCESS AUTOMATION USAGE IN LOGISTICS

RPA is reshaping the logistics industry by improving the efficiency of operations and reducing costs in a dynamic and competitive environment, RPA being a digital enabler is reshaping the traditional way of logistics operation by creating a shift toward automated workflow and processes that improve the overall productivity in logistics organization (Vuram, 2023). In addition, RPA acts as a tool for process optimization by automating critical tasks such as order processing, inventory management, and shipment tracking, its integration into supply chain operation has significantly improved visibility, speed and accuracy which are critical factors in achieving logistics excellence.

4.1 Implementations of Robotic Process Automation in Logistics

4.1.1 Inventory Processing and Order Processing

Khan et al. (2022) highlight the important role of RPA in handling a large amount of data within the logistics within the logistics industry, given that data entry is a fundamental

part of logistics, particularly in managing shipments and invoices, the manual execution of these tasks can be very intensive labour wise and subject to inefficiencies. RPA however excels in such processes that are repetitive and require managing lots of data, making it an essential tool for modern logistic operation. By taking advantage of the capability of automation, organizations can significantly improve their accuracy and efficiency in tracking shipment details and invoice data. For instance, RPA can seamlessly operate in retrieving progressive rotating order (PRO) shipment details from the provider website which reduces the manual workload and minimizes errors. In addition to tracking and invoicing, Inventory management is another crucial aspect in logistics where RPA proves to be highly beneficial, effective inventory is important for both producer and distributor as it ensures that customer demands are efficiently resolved and met. Inventory management essentially involves gathering information from multiple sources while comparing it against customers' demands and making decisions based on data, RPA bot excels in these kinds of tasks by collecting and processing data from various systems, providing real-time reports and optimizing inventory levels. Moreover, order processing in logistics requires lots of paperwork and manual data entry which can be time and resource-consuming, manual handling of data is prone to human error which makes the process more complicated, the implementation of RPA will automate order processing which reduces the reliance on manual effort while improving accuracy and speed of order processing operation. Khan et al. (2022) concluded that integrating RPA in logistics would not only improve operation effectiveness but would enable the organization to adapt to increasing market demand with precision.

4.1.2 Scheduling of Shipment and Tracking

RPA has emerged as a very important tool in logistics particularly in the automation of shipment schedules and product tracking. Traditionally, processes such as pick-up orders, and monitoring delivery statuses across operations were governed by strict regulation and also require a significant amount of human intervention due to the high volume of logistic jobs. However, RPA has improved these processes by using software bots with data management capabilities, these bots can extract shipment details from email and track jobs that have been scheduled which ensures that pick-up times are accurate and can significantly increase customer trust in such organizations. Additionally, manually monitoring the carrier's website to get shipment evidence is quite a tiring and time-consuming task for personnel, RPA can easily handle this task by enabling software bots to retrieve and use the shipment data against the original order records which makes order tracking easy. As a result, customers can easily log into their profiles with the logistics provider to track their shipment, ascertain the estimated delivery time and receive notification regarding any potential delay (Khan et al., 2022)

4.1.3 Invoice management

Khan et al. (2022) highlight the efficiency of software bots in invoice management, emphasizing their ability to streamline financial processes within the logistics industry, with RPA capabilities, software bots can easily interface with commercial goods transportation systems with full automation in order to cash workflows for large logistics providers. One of the major challenges in logistics is delayed payment after service completion, which can negatively affect cash flow and operational efficiency, RPA can address these issues by simply automating invoice processing which reduces the reliance on manual tasks such as data entry, cutting and pasting of information and physical inputting billing details. Moreover, RPA can speed up the invoice management process by extracting shipping information and updating client records in a matter of seconds which surpasses executing these tasks manually. Also, invoice management involves managing large volumes of data which can increase the overall number of transactions received, processed and distributed, the manual approach to this task is time-consuming whereas RPA can easily automate this entire process. With automated solutions, organizations can efficiently track outstanding payments, analyse invoice details extract critical information and make payments seamlessly.

4.1.4 Satisfaction of Customers

The implementation of RPA in logistics significantly reduces the chances of manual mistakes made by staff, leading to enhanced customer satisfaction. RPA guarantees that information handling is performed with high accuracy and efficiency. Having access to complete and current customer records allows companies to interact with customers in a more tailored way, which surpasses traditional methods of record management. Additionally, timely and error-free deliveries play a crucial role in customer satisfaction, which is vital for gaining a competitive advantage in the logistics sector; satisfied customers are more inclined to return, making customer retention a key objective that RPA can aid in accomplishing. Moreover, organizations can utilize RPA to consolidate data from different stages of the transportation process, enabling them to quickly respond to customer inquiries. This enhances service delivery, as customers will receive real-time updates, automated notifications, and chatbot support, ensuring they obtain timely and accurate information about their shipments. By ensuring stable communication and providing dependable services, logistics companies can cultivate the trust and long-term loyalty of their customers. In the current market environment, where customer expectations are on the rise, RPA acts as a tool that helps businesses fulfil and surpass these requirements. Through the automation of critical logistics processes, companies can create a smooth customer experience, positioning them as trustworthy players in the logistics industry (Khan et al., 2022).

4.1.5 Communication

Effective communication with customers is a critical factor for logistics organizations aiming to improve customer satisfaction. According to Khan et al. (2022), RPA can streamline communication by sending automatic notifications to customers at each stage of the order process, such as when an order is confirmed, shipped or delayed. By integrating RPA into the messaging system, logistics companies can significantly improve their interaction with customers which leads to higher customer satisfaction, optimized processes and an increase in profitability. In logistics, various stakeholders such as senior managers, employees, advisers and users require timely access to product and shipment information but due to the complex nature of the transportation chain, miscommunication may occur between relevant parties. However, RPA solutions such as chatbots and automatic responders can address this challenge ensuring that information is accurate and promptly communicated to whoever requires it, automated email alerts and notifications can be scheduled at regular intervals to keep stakeholders informed and up to date. Similarly, chatbots are also a great tool that can provide assistance to customers regarding, order process, shipment tracking, potential delays and so on (Khan et al., 2022).

4.1.6 Generation of Reports

RPA has significantly improved the efficiency of report generation in logistics and the logistics industry, companies in this industry create reports regularly which pertain to order processes, payments, customer feedback and equipment updates. The manual creation of this report required a lot of manual effort, time-consuming and prone to errors. With an RPA solution, the process can easily be automated by allowing software bots to collect, organize, and generate a report without human involvement, the system pulls data from different sources which ensure that reports are accurate and available on time, this enables an organization to make informed decision, Additionally, automating report generation would save employees from executing repetitive work which gives them time to focus on strategic responsibilities. RPA can improve efficiency, and minimize errors ensuring that organizations have access to the relevant information they require to manage their logistics smoothly (Khan et al., 2022).

4.1.7 Document Management

Handling documentation in logistics can be complex and labour-intensive, necessitating careful management of records like bills of lading and proof of delivery documents. These documents are essential for ensuring that customers receive the right products and proof of delivery within the anticipated timeframe. Nonetheless, manually executing this process can be burdensome for staff. RPA bots can be employed to automatically gather both incoming and outgoing documents. These bots can effectively manage tasks such as

opening email attachments, organizing various types of documents, extracting important details, and saving them in the company database. This reduces the necessity for manual data entry and minimizes repetitive tasks. By adopting RPA, logistics firms can keep documentation well-organized, making information readily accessible and decreasing errors in documentation (Mammen, 2023).

4.1.8 Planning of Demand and Supply

Effective supply and demand involve gathering, organizing and analysing relevant data to into useful format to develop strategic plan for supply and demand. However, this process can be time-consuming and tiring for employees, RPA can help organizations predict demand and prepare for any unexpected increases by automating these tasks. This would ensure that the process is faster, reduce human errors and make the planning more accurate and efficient. Although human involvement is still needed in areas like customer service and management, RPA can assist with various logistics tasks, such as procurement, inventory management, warehouse operations, and shipping. RPA bots can track market trends, predict demand changes, and automatically inform procurement teams, helping businesses make better decisions and improve supply chain management (Khan et al., 2022).

4.2 Benefits of Using Robotic Process Automation in Logistics

The adoption of RPA in logistics offers numerous benefits to the industry which include but are not limited to the following:

According to Vuram (2023), RPA is transforming logistics operations by reducing the need for manual intervention leading to significant cost savings, minimal errors and lower labour expenses, the savings of this resource can be invested in other areas of the organization such as innovation and employee development which would bring about organization growth.

Implementing RPA allows business to optimize delivery schedule and routes, ensuring timely fulfilments of customers' demands. This not only speed up deliveries and improve customer satisfaction but also strengthens a company's competitive position. Additionally, by optimizing transportation route, RPA supports sustainability effort by reducing fuel consumption and emissions (Vuram, 2023).

RPA is a tool that is notable for reducing manual errors and this also applies to logistics processes, it is very easy for personnel to mistype or misread data especially when carrying out tasks that contain numerous repetitive documents. Well-implemented software bots will carry out such task in time and efficiently without errors (Canon, 2024).

RPA does not only reduce errors, it can completely transform capacity in terms of carrying out more tasks in less time which would normally take a personnel days or longer time to complete, RPA bots do not get tired or fatigued or take coffee break, for the right kind of task and with proper configuration, RPA can increase capacity level for certain business processes that are mostly considered impossible (Canon, 2024).

Another benefit of RPA is its ability to minimize process dependencies and human delays, in many organizations. Approvals for procedures, forms, and workflows can be delayed when key personnel are unavailable. RPA cannot replace all forms of approval, but it can remove some. Some of the elements that certain approvers may be reviewing may be automated. Automation can also identify when an approval gets stalled for more than a certain period of time, or when an approver is absent, and route the delivery to a chosen substitute (Canon, 2024).

4.3 Challenges of Implementing Robotic Process Automation in Logistics

Fischer et al. (2023) identified the challenges that can impede the successful implementation of RPA in logistics processes, the authors categorized these challenges into three different group namely, the technical challenges, organizational challenges and environmental challenges.

4.3.1 Technical Challenges

The author identified four main categories of technical challenges, with IT infrastructure being a major concern, this involves the difficulties that relate to an organization's system setup such as the lack of electronic data interchange (EDI) enabled IT system and the presence of outdated and complex IT infrastructure. Flechsig et al. (2022) noted that some external stakeholders may hesitate to communicate due to concerns over transparency and the high cost of RPA adoption, which can lead to issues with RPA bot performance. These problems become more severe when databases are not properly maintained or when storage capacity is inadequate. Additionally, the absence of standardized data formats across different parties can increase errors and make the process somewhat complicated (Cooper et al., 2019; Flechsig et al., 2022). To address these concerns, Sayed et al. (2020) emphasized the need for structured data, although AI technologies can assist in handling unstructured data, Fernandez and Aman (2021) also pointed out the risk linked to poorly configured bots, while Eaton et al (2022) stressed the importance of clear IT governance and proactive measures to prevent potential risks. Without sufficient IT investment and detailed documentation, the efficiency and effectiveness of RPA may be significantly reduced (Flechsig et al., 2022; Costa et al., 2022).

Data security is another significant challenge in RPA implementation, the author stresses the need to protect sensitive data due to the fact that RPA bots are granted access to

company databases using organization credentials assigned to them, and they often possess extensive permission, this access poses another concerns due to risk of them being exposed especially in areas such as accounting and procurement where sensitive financial data are stored(Costa et al., 2022; Fernandez and Aman, 2021; Santos et al., 2020). To address this risk, RPA providers must ensure that clients fully understand how RPA bots operate and are aware of the security measures in place to protect their data (Cooper et al., 2019).

System failure can also present a major challenge in the implementation of RPA, this failure may occur due to human error or external factors such as power outages or disruptions at the control centre (Fernandez & Aman, 2021). The author highlights the importance of having a contingency plan in place to address such issues as bot malfunctions can lead to errors and quality concerns (Fernandez et al., 2021). Furthermore, Eaton et al. (2022) highlight that RPA bots may struggle to adapt to system upgrades or newly developed websites due to their limited flexibility.

Maintenance of an RPA system can be a significant challenge, as it requires continuous updates and adjustments especially when modifications are made to user interfaces. This continuous maintenance process can be both time-consuming and expensive (Santos et al., 2020). However, regular maintenance and reconfiguration of software bots are important for extending their lifespan and ensuring that they perform optimally which makes maintenance an essential aspect of long-term RPA deployment.

4.3.2 Organizational Challenges

Some authors opined that the main challenges of RPA implementation are not necessarily technical but rather economic and people-related (Viale and Zouari, 2020; van Hoek et al., 2022). The authors categorized these organizational challenges into five subgroups.

The first subgroup addresses the identification of the right processes and use cases for automation. This step is key as organizations must carefully analyse and select processes that align with RPA capabilities, with consideration of the high costs associated with automation (Krenova et al., 2021). Sirdeska (202) highlights that predefined criteria can be used to determine the processes that are suitable for automation. However, some companies make the mistake of attempting to automate processes that are not well suited for automation or take on complex and labour-intensive tasks that involve several stakeholders which can create additional challenges (Costa et al., 2022). Another challenge is the presence of fragmented processes that may need restricting before they can be automated (Hedge et al., 2018; Lacity & Willcocks, 2021). Ensuring process standardization and maintaining a comprehensive workflow is crucial but often challenging (Jain, 2019; Osmundsen et al., 2019). Additionally, deciding which employees should be involved in the automation process and determining the best time

to initiate RPA implementation are also huge challenges that organizations must address (Lamberton et al., 2017; Chugh et al., 2022).

Another significant organisational challenge in RPA implementation is financing and pricing. Despite the potential benefits, many promising RPA projects are often rejected due to the high costs that are associated with its deployment and maintenance (Flechsig et al., 2022). Another challenge with RPA implementation is the total project cost cannot be fully ascertained at the beginning of deployment additional expenses will surface such as employee training, IT system adaptation amongst others. Moreover, the initial project may fail to deliver the expected return on investment (ROI) due to unforeseen complications. Scalability is another concern when implementing RPA on a larger scale or across an entire organization. Syed et al. (2020) highlight that addressing these challenges requires innovative strategies to ensure smooth and seamless expansion. Additionally, pricing models for RPA services are another challenge since RPA bots' complete tasks faster the human employees, and traditional pricing models based on actual hours worked are no longer suitable. This necessitates new methods for determining service costs and structuring contracts that account for automation-driven efficiency (Cooper et al., 2019).

The third; challenge in RPA implementation relates to governance and organizational design, workforce resistance may arise due to changes in procedures as workers feel it is quite tedious to adapt to new processes (Flechsig et al., 2022; van Hoek et al., 2022), Additionally, bureaucratic structures, approval processes and unclear may slow down the integration of RPA, Flechsig et al. (2022) also highlights that ineffective internal communication can further complicate RPA implementation efforts.

Another critical challenge is human intervention and control, while RPA can execute tasks autonomously, it is still not an independent system, and it requires careful preparation, continuous monitoring and human supervision (Viale and Zouari, 2020). Although bots do not need supervision for routine tasks, employees must be available to troubleshoot technical issues when they arise (Fernandez & Aman, 2021; Křenková et al., 2021). Furthermore, RPA has limitations due to the lack of artificial intelligence, meaning bots often rely on human judgement and intervention for decision-making (Eaton et al., 2022; Fernandez and Aman, 2021).

Lastly, a significant obstacle to RPA implementation is the shortage of skilled specialists. Many organisations struggle to find professionals with the expertise needed to design, implement, and maintain RPA systems (Chugh et al., 2022). Additionally, training employees to work with automated processes remains a challenge (Costa et al., 2022). As a result, businesses increasingly rely on external experts to fill this skills gap (Hedge et al., 2018). Adequate IT support from specialists is essential for the successful deployment and long-term sustainability of RPA solutions (Jain, 2019; Flechsig et al., 2022).

4.3.3 Environmental Challenges

Regarding environmental challenges, one significant factor is the awareness and perception of stakeholders, while technology brings significant benefits to organizations, not all stakeholders readily accept these changes. In the case of RPA implementation, some stakeholders may resist its implementation due to unfamiliarity with its functionality and technology (Gotthardt et al., 2020; Křenková et al., 2021), Resistance may also come from employees who fear that automation may replace their jobs. Additionally, concern about data is another major challenge, as stakeholders may worry about the safety and privacy of sensitive information when integrating RPA into business operations (Cooper et al., 2019; Gotthardt et al., 2020). A lack of trust in the system's security features could lead to doubt and rejection of the technology. According to Jain (2019), prioritizing RPA implementation in supply chain management is particularly difficult due to the reluctance of stakeholders and employees who prefer the traditional way of doing things. To successfully integrate RPA, organizations must address these concerns through effective change management strategies, stakeholder engagement and proper training programs.

5 RESEARCH METHODOLOGY

This section describes and analyses the methodological approach for this study and reflects upon the methods, procedures and approaches used to answer its research question. Firstly, the research approach will be presented followed by a discussion on the chosen research design. The decisions concerning the data collection methodology and the data analysis process will thereafter be described and analysed.

5.1 Research Design

This study adopted a qualitative research method. A qualitative research method is suitable for being able to answer research questions that contain "why" and "how", to unfold behaviours, motivations, and other social realities which in other ways can be challenging to answer through quantitative assessments. Unlike a quantitative method, the qualitative method emphasizes the inductive research approach where the focus has been on generating theories (Bryman, 2011). Since the purpose was to study an RPA implementation within two different organizations, the qualitative research method was deemed suitable.

The research, based on the practical implementation of RPA solutions and semi-structured interviews, was designed to effectively address the study's four research questions. This approach allowed the researcher to explore how RPA is implemented (RQ1), assess the benefits achieved (RQ2), identify the challenges encountered during implementation (RQ3), and evaluate how employees perceive the impact of RPA on their

daily work and overall processes (RQ4). The method enabled the collection of detailed, experience-based insights, which were essential for analysing these aspects in real-world organisational contexts.

5.2 Data Collection Method

To gain a comprehensive understanding of how RPA is being implemented in the two different companies' logistics processes, we utilized both the primary and secondary data collection methods. A key aspect of this research was the use of open-ended questions, which were carefully designed to encourage participant to share their insights and experiences. As noted by Creswell (2010), open-ended questions are particularly valuable when direct observation of participants is not feasible, as they allow respondents to describe their experiences in rich detail. While interviews were conducted with some participants, not all respondents were available for direct interviews. In such cases, we relied on the responses provided through the pre-distributed questionnaires. This approach ensured that all selected participants could contribute to the research, regardless of their availability for real-time discussions.

A total of nine respondents participated in the study, representing different roles across the two companies. Table 4 provides a breakdown of the respondents and their respective roles:

Table 2: Respondents and Their Roles

Respondent	**Respondent's Role**	**Company**
Respondent 1	Supply chain and Logistics specialist	Retail Company
Respondent 2	Logistics Specialist	Retail Company
Respondent 3	Logistics Officer	Retail Company
Respondent 4	RPA developer	Retail Company
Respondent 5	RPA Consultant	Retail Company
Respondent 6	Opex coordinator	Pharmaceutical Company
Respondent 7	Logistics Officer	Pharmaceutical Company

Respondent 8	Data Analytics Specialist	Pharmaceutical Company
Respondent 9	Data Analytics Specialist	Pharmaceutical Company

Source: Own Work

The objective of the interviews was to learn from the employee on how RPA is being implemented in logistics operation, identify the opportunities it presents, and highlights challenges that were encountered during implementation process, to ensure our questions captured the most relevant insights from respondents, we conducted an extensive literature on RPA implementation in logistic which focuses on implementation methods, industry best practices and case studies. This enabled us to design interview questions that would provide meaningful responses and a comprehensive understanding of RPA implementation within the two companies.

5.3 Data Analysis Method

The data analysis was carried out using thematic analysis to systematically identify, analyse and interpret patterns with our collected data, following the approach outlined by Braun and Clarke (2006). This method would allow us to make sense of the response from the interviewee by breaking down the data into meaningful themes and directly addressing our research questions.

The first step involved familiarizing ourselves with the data by carefully reading and rereading the responses from the interviews and questionnaires to gain an in-depth understanding of the data. This process enabled us to familiarize ourselves with the data and identify initial ideas. Next, we proceeded with coding, where we highlighted key phrases and statements that stood out in the responses. We manually assigned codes to these meaningful and important parts of the response to ensure that we captured significant insights that are related to the implementation of PRA in logistics.

Following this, we examined the codes and patterns and grouped them into broader themes. This phase of the analysis required us to refine and reorganize the codes so as to ensure that they are in line and represent the experiences and views of our respondents. We paid close attention to recurring topics, contradictions and unique viewpoints from respondents of both companies. After identifying the themes, we reviewed and refined them to ensure that they were clear and precise as well as capturing the different aspects of the data, we then revisited our original data to confirm that the themes accurately reflect the responses and made necessary adjustments where required. Finally, we defined and named the themes, ensuring that they represent the essence of the findings. This process helped us structure our analysis in a way that effectively communicated how RPA was

implemented, the opportunities it presented, and the challenges encountered in both companies. Thematic analysis allows us to extract meaningful information that deepens our understanding of RPA's role in logistics. This method provided a structured and flexible approach that allowed us to interpret the data meaningfully while maintaining the perspective of the respondents.

5.4 Individual Contributions

We focused on a different aspect of this research thesis in order to ensure a comprehensive view from both researchers, Researcher A focused on the data collection and analysis for the company using UiPath as well as gathering primary data and conducting interviews with the logistics and RPA department, Researcher B concentrated on the company using Blue Prism, carrying out the same activity as researcher A as well as using a similar approach in gathering primary data collection and conducting the interview, both researchers cooperated on secondary sources that constitute the previous chapters, this division of labour would ensure a thorough and in-depth view as well as a balanced examination of RPA implementation in both companies.

5.5 Case Selection Criteria

According to Hyett et al. (2014). Case research is used to identify what is common and specific about a case, it offers a means to develop new theoretical frameworks and to establish empirical validity, it allows for researchers to uncover unique insights and generate theoretical perspective. Hence, a case is very iterative, jumping backwards and forward to the different steps. These eight steps are: getting started, selecting cases, crafting instruments and protocols, entering the field, analysing data, shaping a hypothesis, enfolding literature and reaching closure. By getting started, the research question has been introduced as well as how the research is intended to be carried out. The case selection is not necessary or preferable to be random. The main criterion to choose the cases is the availability of the data. For the purpose of this thesis, the researchers have identified a company that uses UiPath and another that uses Blue Prism to automate their logistics process, an in-depth explanation of their RPA journey is discussed extensively in the next section.

5.6 Case Description

5.6.1 Case 1: Selected Company

This chapter constitutes the practical segment of the thesis, detailing a specific instance under examination. The research focuses on a particular process within the logistics department of the chosen retail company. The objective is to analyse the application of

RPA in supporting logistical operations within the retail company. As previously discussed, the integration of RPA is a designated project within this company. Through this analysis, we aim to pinpoint the pertinent factors in process selection for RPA implementation, strategies to enhance bot-employee interactions, and considerations regarding compliance. Additionally, we will formulate a collaborative framework between the logistics department of the designated company and its IT subsidiary for RPA utilization.

The parameters of this examination are as follows: Only logistical processes will be considered for RPA automation. The study will utilize UiPath software, recognized as a premier tool in the realm of RPA. Furthermore, the necessary infrastructure has already been established, encompassing the management of company virtual machines and the UiPath Orchestrator, the central platform for process management.

5.6.2 Overview of the Company

The company, a renowned German based retail organization, will remain unnamed due to confidentiality. It operated with multiple departments and has adopted RPA to enhance operations particularly within the logistics department which is the main focus of this study.

The implementation of RPA in the company involves both attended and unattended modes. Attended bots are programmed by employees using UiPath studio, while unattended bots are managed through UiPath Orchestrator, which schedules bots to run at specific intervals which can be daily, monthly or annually. Each process has a level of criticality that determines it execution priority. Orchestrator organizes these into departmental folders labelled with unique names and BPBA numbers.

Furthermore, the company utilizes virtual machine environments for both modes. Attended bots runs locally, while unattended bots are tested and then deployed via orchestrator. All bots are programmed to follow company automation standards using UiPath's ReFrameWork, selected based on project size which essentially entails using Enterprise version for large scale processes and Light version for simpler processes.

For tasks involving resources like SAP or Excel, the company prefers using simple UiPath activities to reduce costs, though Excel permissions are granted when necessary. Dynamic automation practices are emphasized, with adaptable selectors ensuring future-proofing. UiPath academy guidelines inform best practices, but employees can innovate as long as they follow the rules.

The company utilizes Teams as its primary communication platform. To enhance tracking, each bot is assigned Jira tickets, where progress updates are logged regarding

their current stage. Additionally, to safeguard the bots, GitLab is employed as a repository. This serves as a contingency plan in case of bot failure or as a backup solution.

5.6.3 Project Planning

This section outlines the comprehensive planning process for automating manual processes within the logistics department using Robotic Process Automation (RPA) with UiPath.
The primary objectives include implementing non-attended automation, fostering collaboration between the logistics department and the RPA department, and evaluating the benefits of automation in terms of time saving and efficiency gains.

Project Objectives and Goals:

- Implement non-attended automation for manual processes within the logistics department.
- Facilitate collaboration and communication between the logistics department and RPA department.
- Quantify the benefits of automation by comparing the time taken for manual processes versus automated processes.
- Benefits from UiPath.

The project scope includes:

- Assessment by IT consultants to determine the feasibility of automation.
- Documentation of manual processes by the functional area.
- Development of RPA bots based on documented processes.
- Implementation of bots and monitoring of performance.
- Evaluation of time saving and efficiency gains.

The study will require the expertise of RPA developers, IT consultants, and functional area staff to ensure a comprehensive approach to automation implementation. Essential tools and software include UiPath for bot development, a documentation platform such as a Wiki for process documentation, project management tools like Jira, and version control repositories to facilitate efficient project coordination, tracking and collaborative software development.

Regular meetings, progress updates, and documentation ensure alignment and transparency throughout the project lifecycle.

We will identify potential risks, including technical challenges, resistance to change, and discrepancies in process documentation. To mitigate these risks, we will prioritize regular

communication among team members, engage stakeholders throughout the project, and develop contingency plans to address unforeseen obstacles.

Our approach to quality assurance involves implementing thorough testing procedures to validate the functionality and reliability of RPA bots. This includes conducting user acceptance testing to ensure that automated processes meet the requirements and expectations of end-users.

Adhering to ethical standards is paramount in our study. We will ensure compliance with data privacy, confidentiality, and relevant regulations throughout the automation process. Obtaining consent from stakeholders for process automation and maintaining transparency in decision-making processes will be integral to our ethical approach.

By adhering to the outlined project plan, we aim to successfully automate manual processes within the logistics department using RPA. Through collaboration, documentation, and rigorous testing, we anticipate significant time saving and efficiency gains, ultimately enhancing the overall performance and effectiveness of logistics operations.

5.6.4 Case 2: Selected Company

This section of the thesis focuses on the practical implementation of Blue Prism at the second company, specifically within their Data & Analytics department. The department has been actively automating processes using various tools such as Alteryx and running Business Intelligence Analyses (BIA).

However, the company is going into Robotic Process Automation (RPA) for the first time, making this project, known as 'Opex' one of their largest initiatives. To initiate the implementation, the company needed to acquire the Premium licence of Blue Prism. This license enables the bot to run unattended, with a scheduled monthly run at the beginning of each month. The responsibility of acquiring the license and managing it falls under the IT department.

Recognizing the significance of this project and the company's lack of prior experience with RPA, weekly forums dedicated to Blue Prism were established every Tuesday and Thursday. These forums provided a platform for the team to seek support from the Indian team, who assisted with any queries regarding bot development or any other necessary information. If this initial RPA project proves successful, the company plans to continue automating additional processes, leveraging RPA to save time on repetitive tasks.

In the first example, the department was an RPA team full of experts who had a lot of experience working with UiPath. They knew exactly what to do and how to handle automated processes. In this case, though, the department is made up of data analysts, and

it’s their first time working with RPA. They’re not as familiar with the tools and processes, so it took more effort to guide and ensure everything is set up correctly.

5.6.5 Overview of the Company

The organization in question is a globally recognized and innovative pharmaceutical company based in Switzerland. With a presence in Slovenia and numerous other countries, it has established itself as a major player in the healthcare industry. The company is known for its commitment to advancing medical science and technology to develop groundbreaking therapies and medications. On a global scale, it is regarded as a leading and influential company in the healthcare sector, with a focus on innovation and improving patient outcomes.

The initial step of the project involved securing the premium license for Blue Prism. This was coordinated by the IT department, with the assistance of our team, who provided additional information required for the licensing process. As our company's communication channel is Teams, a dedicated channel named 'Opex RPA' was created to consolidate all the necessary steps for RPA development. This included documentation of the manual process, details of the software utilized by the bot, and any other pertinent information related to Blue Prism.

To gain a better understanding of the software, the team utilized education platforms such as Up4Growth and Coursera, which were supported by the company. The Opex team, which seeks to automate the process, collaborated closely with our Data Analytics department diligently documented the process in a Word file, providing clear instructions. Furthermore, the process was recorded using Teams and added to the Opex RPA channel.

The unattended process is scheduled to run on the 6th day of each month, enabling the assessment of Key Performance Indicators (KPIs). The bot is being developed in a dynamic manner, ensuring it can adapt to any changes that may occur in subsequent months. The Control Room, a core component of Blue Prism, will be leveraged for testing and running the process in an unattended mode.

5.6.6 Project Planning

This section outlines the strategic plan for automating manual processes within the Data Analytics department using Blue Prism's Robotic Process Automation (RPA) platform.

Project Objectives:

- Develop a bot using Blue Prism to automate manual processes within the Data Analytics department.
- Quantify the time saved and efficiency gains achieved through automation.

- Evaluate the overall benefits of implementing Blue Prism for process automation.

Project Goals:

- Compare the time taken for manual processes versus automated processes.
- Assess the benefits of Blue Prism in terms of increased productivity and accuracy.

The project scope encompasses several key aspects:

- Documentation of the manual processes within the Data Analytics department.
- Development of an RPA bot using Blue Prism based on the documented processes.
- Thorough testing and refinement of the bot's functionality before deployment.
- Evaluation of time-saving and efficiency gains achieved through automation.

To ensure the project's success, we hold regular meetings every Tuesday and Thursday. These meetings are essential for collaborating, tracking progress, and resolving any challenges during the bot development process. As we mentioned before, the support we received from Blue Prism during these meetings was incredibly helpful in understanding how Blue Prism works. If this project turns out to be successful and has a positive impact on the functional area, it could lead to the company adopting RPA for other processes or automating even more tasks. This project is essentially our first test case.

We're taking a systematic approach to this project. First, we test and refine the process in the Blue Prism app to make sure everything works as expected. Once the bot performs well, we move it to the Control Room for further testing and monitoring. This cycle of development, testing, and validation continues until the bot runs smoothly without issues.

By using Blue Prism's unattended bot, we're able to streamline tasks and eliminate errors, reducing the need for manual effort. This increases efficiency and allows the Data Analytics team to focus on more valuable work, like analysing data and making informed decisions.

As part of the project, we're also evaluating the benefits of using Blue Prism. This includes calculating the time saved compared to manual processes and assessing how much more efficient the process has become. A return on investment (ROI) analysis will help us determine whether this automation is cost-effective and sustainable in the long run.

Our regular meetings have been key to the project's progress. They provide a space for sharing ideas, solving problems, and keeping everyone on the same page, which has been crucial for speeding up the bot's development.

With thorough documentation, detailed testing, and the powerful capabilities of Blue Prism, we're aiming to save a lot of time and improve efficiency significantly. If this project succeeds, it will open the door to automating even more processes in the future, helping the organization achieve greater operational excellence and better business results.

6 END TO END IMPLEMENTATION OF ROBOTIC PROCESS AUTOMATION

6.1 Practical Implementation of UiPath

This section presents a practical, end-to-end implementation of Robotic Process Automation (RPA) using UiPath within the logistics department of the retail company. It outlines the collaborative approach between the functional area, IT consultants, and developers, beginning with the assessment of the selected process for automation and concluding with the successful deployment of the bot.

The implementation showcases how UiPath's tools, such as Orchestrator and ReFramework, were leveraged to automate a repetitive, rule-based task involving SAP, Excel, and Outlook.

6.1.1 Implementation Flow

Before initiating the implementation of the bot by the development team, the first step involves collaboration with the functional area, specifically the department seeking to automate its processes.

As outlined, this requires meetings with IT consultants responsible for evaluating whether the process is appropriate for RPA. This assessment involves addressing key questions, such as whether the process is rule-based and repetitive, the time required to perform the task manually, and the level of access or permissions the bot would need. Based on these criteria, IT consultants determine the feasibility of applying RPA to the process.

Figure 7 outlines the entire process the company follows:

Figure 7: Implementation Flow

Source: Own work

Since this study focuses on the logistics department, the department assessed its processes and presented them to the IT consultants. After a thorough evaluation, the IT consultants concluded that the process was suitable for RPA. Following this decision, the developers were informed and tasked with implementing the bot, with one of our team members actively participating in the development process.

6.1.2 Documentation of the Process

In this phase, the developers take over. After receiving confirmation from the IT consultants that the process is suitable for RPA, we begin the development. Before starting, we first need to thoroughly understand what the process entails.

Firstly, we created a dedicated channel in Microsoft Teams for the process to be developed. We then held a meeting with a member of the logistics department who is involved in the process. During this initial meeting, we asked several key questions:

- How many minutes does it take to complete the process manually? This helps determine potential time savings and the overall benefit of automation.
- How critical is the bot?
- What is the expected completion date?
- How frequently will the bot run?

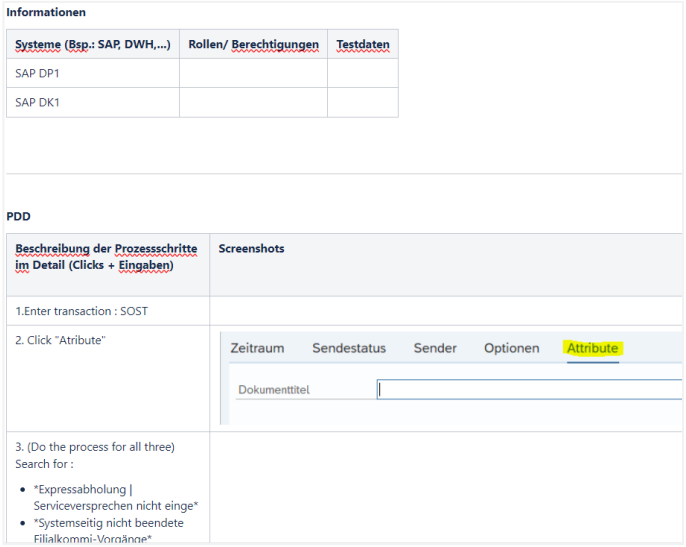
Based on input from the functional area and IT consultants, the process is rule-based, stable, and does not impact sales. The logistics department indicated that the process takes

10 minutes to complete manually. They expect the bot to be ready within a month and a half, meaning the delivery date is April 8th. Our meeting was held on February 27th. The bot will be scheduled to run on the 8th of each month at 16:00, with execution managed through UiPath Orchestrator.

UiPath Orchestrator is a web-based platform used to manage, schedule, and monitor RPA bots. It ensures tasks are executed reliably and on time, providing centralized oversight of logs, errors, and performance metrics.

After collecting this information, we scheduled a follow-up meeting where the manual process would be demonstrated and recorded for documentation purposes. Additionally, we use a wiki website to store all bot-related information, including the Process Design Document (PDD). We introduced the wiki to the logistics team and instructed them to fill in the necessary details. Figure 8 illustrates an example of the wiki interface with PDD documentation.

Figure 8: PDD Example



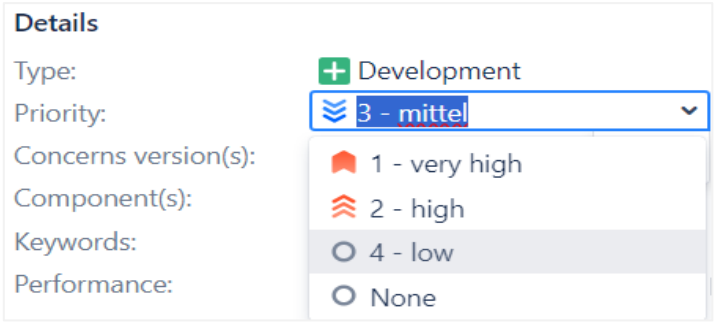
Source: Own work

Before the second Teams meeting, we created a Jira ticket and linked the PDD documentation to it. In the Jira ticket, we included a brief description of the process, the name of the person responsible, the process's criticality based on the functional area's feedback, and a flowchart of the development status. The ticket status was set to "In Progress," as shown in Figure 10, reflecting that the bot is currently in the creation phase.

We also sent an appointment to the functional area representative for the second Teams meeting to review the manual process and record the demonstration for video documentation. Based on feedback from the functional area, this process is not highly critical and does not affect sales directly. However, automating it will save significant time each month, making it a valuable improvement. For this reason, the JIRA ticket was

assigned a medium priority, labelled as "3-Mittel," indicating its importance for development while acknowledging its moderate urgency.

Figure 9: Criticality of the Process



Source: Own work

Figure 9 illustrates the assessed criticality level of the process as documented in Jira. To enhance visibility and track development progress, Figure 10 displays the Jira workflow, which shows each stage a ticket undergoes from creation to implementation and eventual completion. This visual flow provides a clear overview of the project status at any given time, helping the team monitor progress, identify potential delays, and plan resources accordingly.

Figure 10: Jira Flow

Source: Own work

6.1.3 Implementing the Process

This process represents a logistics operation primarily related to export activities, where the logistics team is responsible for verifying quality certificates before goods are dispatched. These certificates are crucial to ensure that products meet the required standards and regulatory expectations of the destination country. The task involves retrieving certificate data from SAP, exporting it into Excel, and applying filters such as by certificate type, validity dates, and customer reference numbers to confirm that the correct documents are in place. Automating this process helped the company reduce

manual workload, improve the speed and accuracy of document validation, minimise delays at customs, and ensure smoother and more compliant international deliveries.

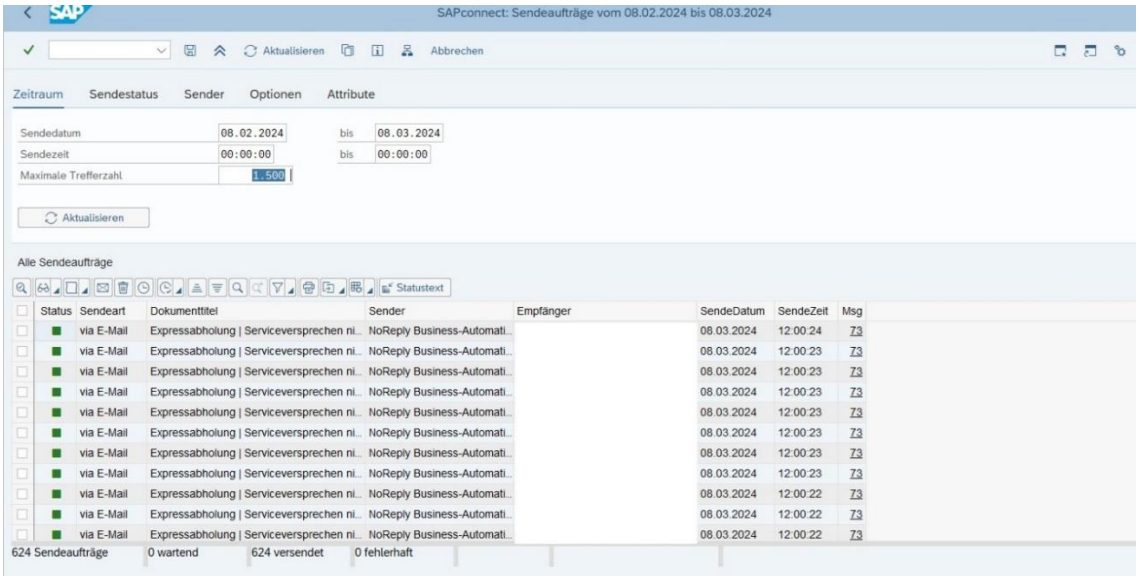
The primary person responsible for executing this process carries it out on the 8th of each month. However, during periods of absence, such as holidays, another member from the logistics department takes over the task.

The process begins by accessing SAP and searching for three distinct certificates. For confidentiality reasons, the specific names of these certificates are omitted from the documentation. First, the SAP application is launched, and the relevant transaction is opened. Within this transaction, the process selects the 'Attribute' option, as illustrated in Figure 11.

The process starts with the first certificate, navigates to the 'Zeitraum' field, sets the maximum number in the 'Maximale Treffer' field to 1500, and configures the 'SendeDatum' field. In the first box, the date is set to the previous month relative to the 8th, using the format mm/dd/yy. In the second box, the current date, which is always the 8th of the month, is entered. Once the data is retrieved, it is downloaded as an Excel file and saved in a designated folder named 'Logistics,' with the filename corresponding to the certificate's name. This process is repeated in a loop, applying the same steps to the second and third certificates, ensuring all files are downloaded and saved consistently.

In Figure 11, we covered the column labelled 'Empfänger' with a white box to conceal confidential data, as the company did not permit the disclosure of email addresses for privacy and security reasons.

Figure 11: SAP Implementation Process



Source: Own work

At this stage, all three certificates are saved in the 'Logistics' folder, with each file named using the certificate name followed by the month and year (e.g., CertificateName_MM.YYYY). Each certificate corresponds to data from different months. Once this step is completed, SAP is closed, and the process continues in Excel to filter the data from the downloaded files.

The next step involves processing the three most recently downloaded Excel files. The filtering steps are as follows:

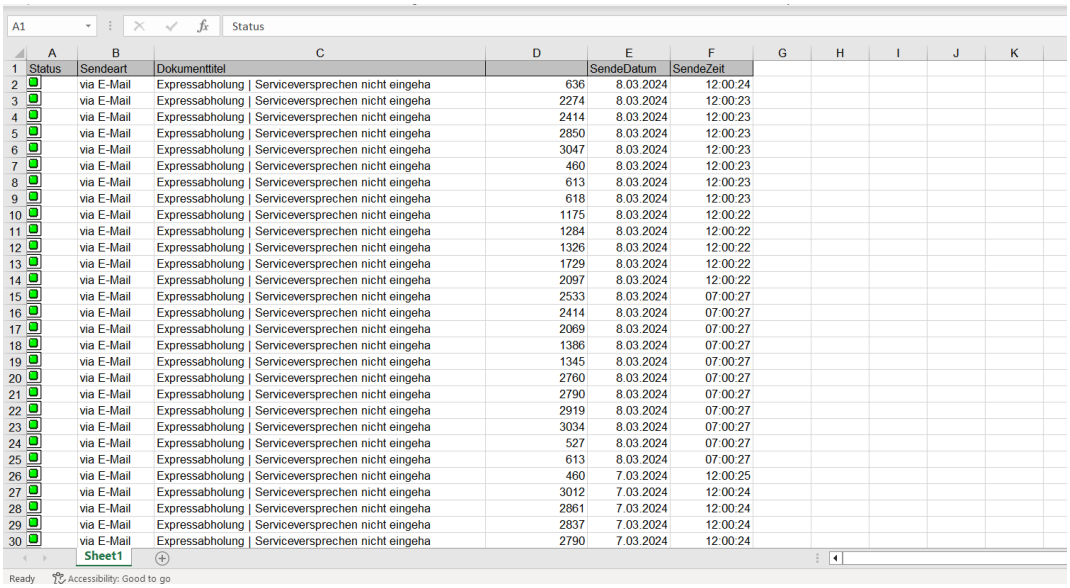
- The Sender column and the Msg column are deleted.
- The process then applies a text-to-columns operation, splitting text first by the letter "A" and then by the "@" symbol.
- Additional rows are deleted based on specific requirements.

Figure 11 illustrates the data extracted from SAP into Excel before the filtering process begins. The 'Empfänger' column is covered to protect confidential data.

Once the filtering is completed, the Excel file will appear as shown in Figure 12. After filtering the data from the first certificate, the file is saved. The process then continues in the same manner for the second and third exported files.

Figure 12 illustrates the final appearance of the filtered Excel file after the filtering steps are completed.

Figure 12: Filtered Excel



	A	B	C	D	E	F
1	Status	Sendeart	Dokumenttitel		SendeDatum	SendeZeit
2		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	636	8.03.2024	12:00:24
3		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	2274	8.03.2024	12:00:23
4		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	2414	8.03.2024	12:00:23
5		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	2850	8.03.2024	12:00:23
6		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	3047	8.03.2024	12:00:23
7		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	460	8.03.2024	12:00:23
8		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	613	8.03.2024	12:00:23
9		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	618	8.03.2024	12:00:23
10		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	1175	8.03.2024	12:00:22
11		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	1284	8.03.2024	12:00:22
12		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	1326	8.03.2024	12:00:22
13		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	1729	8.03.2024	12:00:22
14		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	2097	8.03.2024	12:00:22
15		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	2533	8.03.2024	07:00:27
16		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	2414	8.03.2024	07:00:27
17		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	2069	8.03.2024	07:00:27
18		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	1386	8.03.2024	07:00:27
19		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	1345	8.03.2024	07:00:27
20		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	2760	8.03.2024	07:00:27
21		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	2790	8.03.2024	07:00:27
22		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	2919	8.03.2024	07:00:27
23		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	3034	8.03.2024	07:00:27
24		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	527	8.03.2024	07:00:27
25		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	613	8.03.2024	07:00:27
26		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	460	7.03.2024	12:00:25
27		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	3012	7.03.2024	12:00:24
28		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	2861	7.03.2024	12:00:24
29		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	2837	7.03.2024	12:00:24
30		via E-Mail	Expressabholung | Serviceversprechen nicht eingeha	2790	7.03.2024	12:00:24

Source: Own work

The third and final part of the process involves sending the filtered data via Outlook. Once the filtering and saving steps are complete, the Excel files and the open folder can be

closed. At this stage, the relevant data for the current month needs to be sent to a common email address belonging to the logistics department (logisticsxx@xx.com).

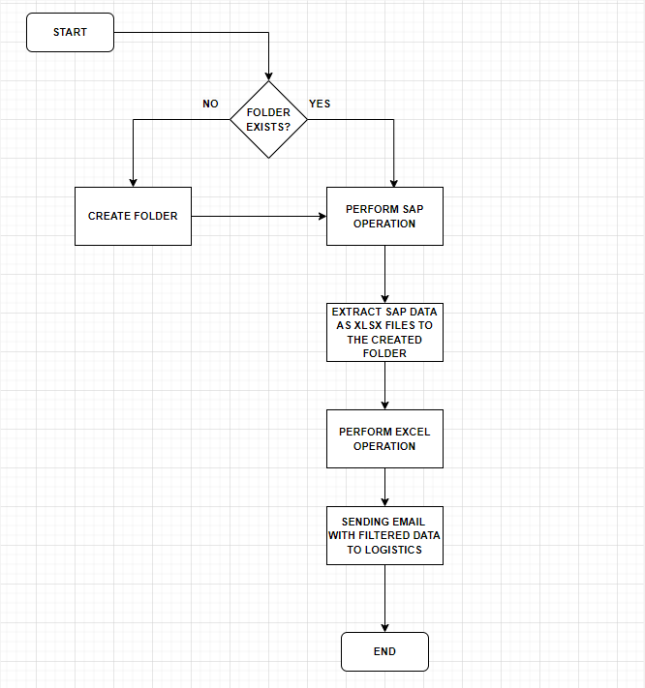
The folder contains multiple Excel files, including those from previous months. The process identifies and selects the three filtered Excel files corresponding to the current month. These files are then attached to an email. The subject line is set as "Data for 08th of [Month]", and the email body includes a brief message: *"These are the three certificates for this month. Many thanks."* After confirming that the email has been successfully sent, the process is complete.

6.1.4 Bot Development Process

The overall process of how the bot is developed can be visualized in the flowchart we created to provide a clear overview of the development steps. The first step involves creating the folder named "Logistics," where all the exported data from SAP will be stored. During coding, we used the "If" activity to check whether the folder already exists. If the folder does not exist, the bot creates a folder named "Logistics." If the folder already exists, the bot proceeds to the next step, which involves performing the required operations in SAP.

As shown in Figure 13, after completing the operations in SAP, the flowchart continues to the Excel filtering phase. By the end of the process, the filtered data is sent via Outlook email.

Figure 13: RPA Flow



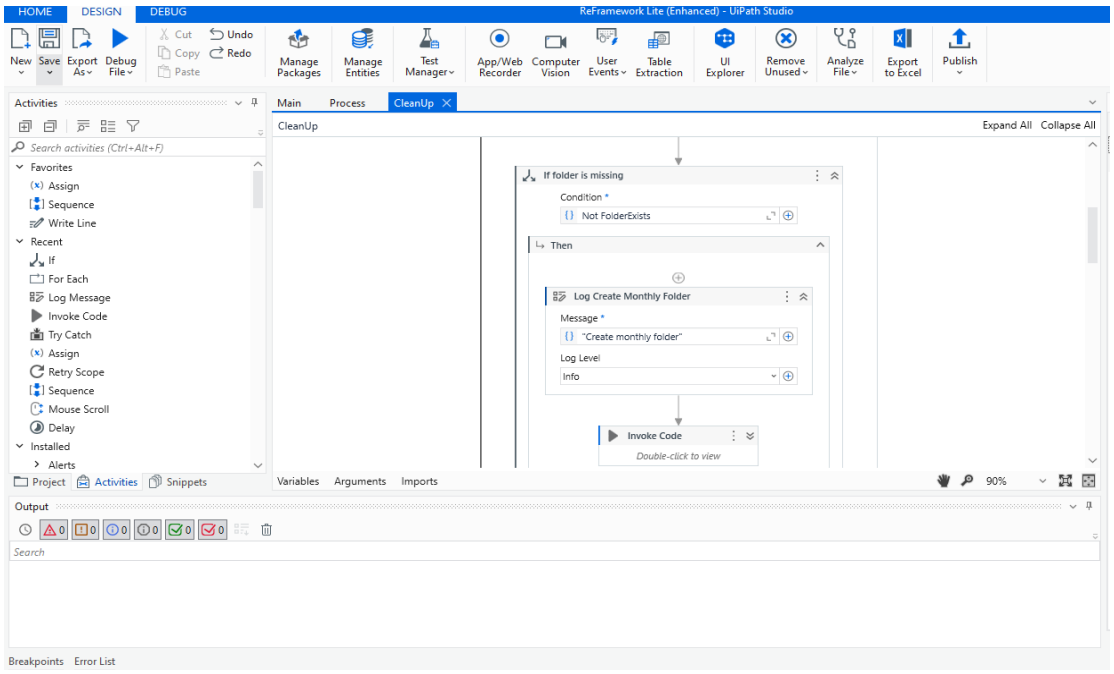
Source: own work

As mentioned earlier, we utilized the ReFramework for this process. The bot is designed to attempt the process up to four times. If it fails all four attempts, it sends an error email. However, if the process is successful in any of these four attempts, the bot sends a success email.

The overall structure of the UiPath ReFramework supports this logic through its three main phases. The Initialization phase handles all initial configurations and setups, ensuring that the environment is properly prepared. This is followed by the Process Transaction phase, where the core automation tasks are executed specifically, operations involving SAP, Excel, and Outlook in this case. Finally, the End Process phase is responsible for determining the outcome of the execution and sending either a success or error email accordingly.

In addition to this structure, the process itself is further divided into specific components for clarity and control. The first part, known as CleanUp as depicted in figure 14, focuses on preparing the necessary folder structure. If the required folder does not exist, the bot creates it; otherwise, it logs a message confirming that the folder already exists. This ensures that the process always begins with the correct directory setup in place, setting a solid foundation for the subsequent workflow.

Figure 14: CleanUp



Source: Own work

After verifying whether the folder already exists or needs to be created, the bot proceeds to the second part of the process, located within the Invoke Code section. In this phase, the bot opens SAP and performs the necessary operations.

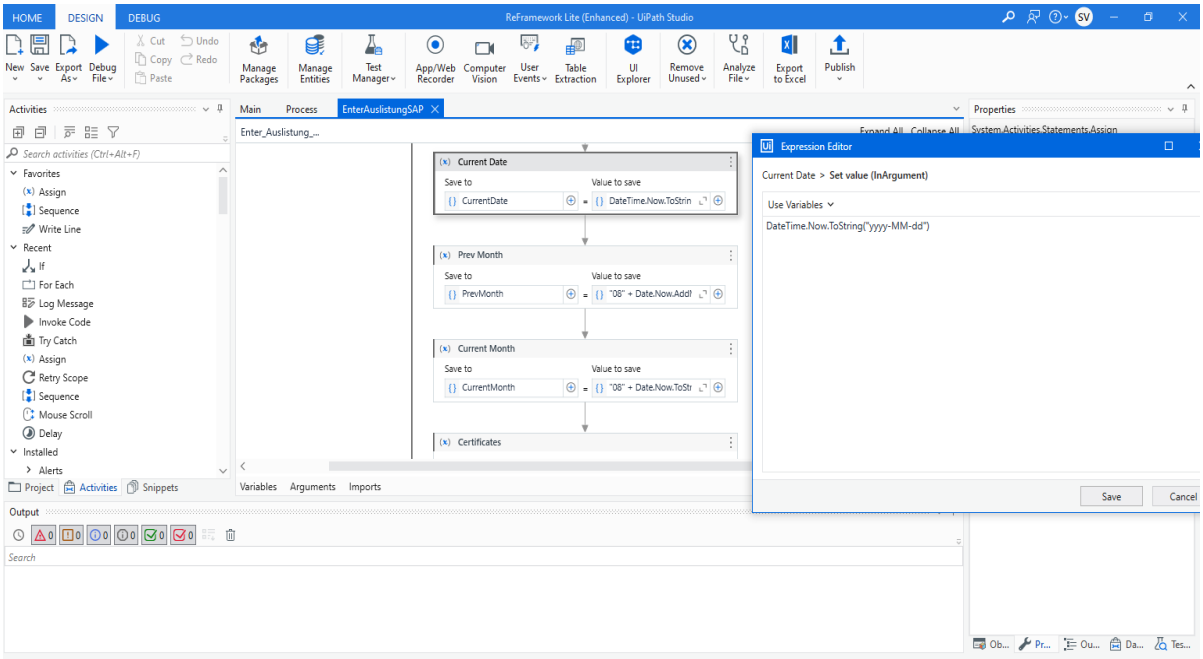
To open SAP, the Open Application activity is used, where SAP is identified dynamically. In the properties panel, selectors are modified from SAP.GUI to SAP* to ensure robustness. This approach allows the bot to adapt to potential changes or differences in the Orchestrator environment, ensuring it runs successfully under various conditions.

This dynamic setup ensures that even if SAP undergoes updates or changes, or if the Orchestrator environment differs, the bot will remain functional and reliable.

Once the SAP window is opened and the appropriate transaction is launched, the operations for setting the current month, maximum number, and other parameters can proceed. To make the process dynamic, we avoided hardcoding specific dates such as "08.03.2024." Instead, we used the Assign activity to create a variable with the following code: DateTime.Now.ToString("yyyy-MM-dd").

This enables the bot to dynamically input the 8th of the current and previous months based on the system date, ensuring flexibility and accuracy in date handling, as shown in Figure 15.

Figure 15: Calculate Dates

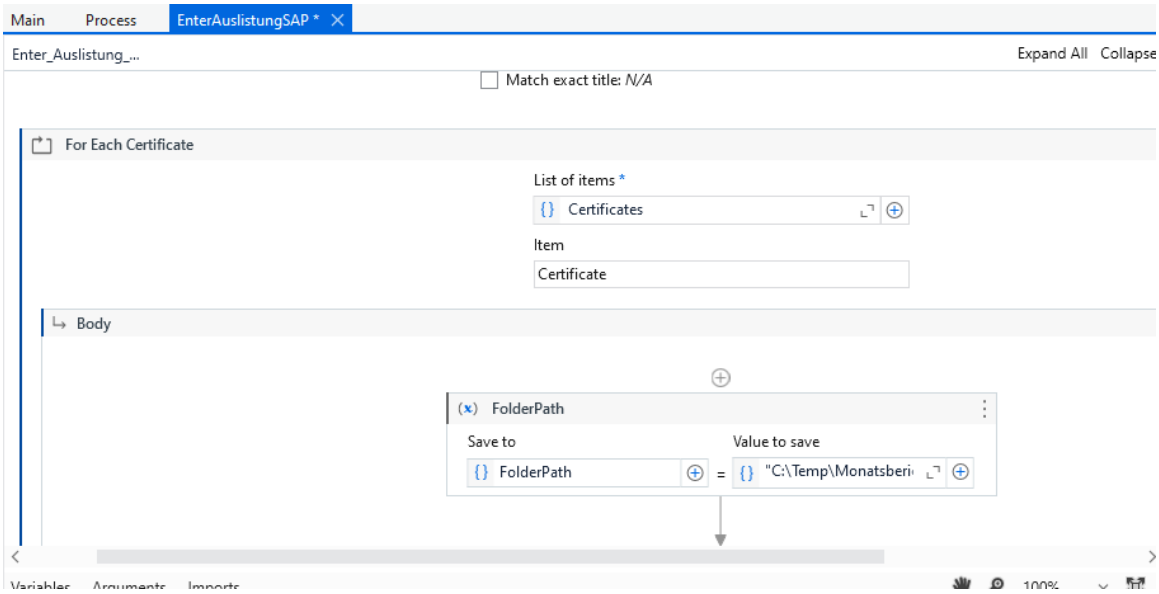


Source: Own work

After implementing all of this dynamically, we also incorporated the names of the three certificates by using a list. Using the Click activity, the bot navigates to the Attribute section, enters the name of the certificate, then moves to the Zeitraum section to input the current month, previous month, and the maximum number.

Once this step is completed, the bot clicks to export the data and saves it dynamically. It uses the folder path we previously created, appending the certificate name along with the current month to the file name. This entire process is executed within a loop, meaning that after downloading the first certificate, the bot continues with the same steps for the second and third certificates. Figure 16 below provides an illustration of how this process is implemented within the loop.

Figure 16: Loop



Source: Own work

After completing all tasks in SAP, the bot closes SAP and proceeds to the next stage, Filter Things in Excel, as outlined in the workflow. This part of the process is executed within a loop, where the bot applies filters such as splitting text, adding columns, and deleting unnecessary columns. Since the folder contains numerous files, the bot identifies the three most recent Excel files and performs the filtering on them. For this, we used the Assign activity to dynamically retrieve the latest three Excel files.

Once the filtering is completed, the bot transitions to the final part of the process: sending an email to the designated common email address. The bot attaches the three most recent filtered Excel files and composes an email. To ensure the subject line is dynamic, we used the Assign activity again to include the relevant date information. For sending the email, the Send Email activity was utilized, where the properties were configured to attach the three filtered files and compose the email body dynamically.

After successfully sending the email with the filtered data, the bot completes its execution. The bot executes the entire workflow within 1 minute.

6.1.5 Success Factor

After sending the email with the filtered data, as the process is implemented using the ReFramework, we added a Send Success Email activity in the Success section of the ReFramework. This ensures confirmation that the process executed successfully. Conversely, if the bot encounters an issue and fails, an error email will be sent instead.

In this case, after sending the email containing the filtered data, the bot also sends a success email as shown in figure 17. This additional step provides assurance that the bot has run successfully and that everything is in order, marking the completion of the process.

Figure 17: Success E-Mail

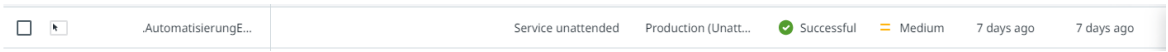
Source: Own work

6.1.6 Orchestrator Testing Process

As we discussed earlier, the Orchestrator is the platform where all bots are managed and run unattended. Once the process is finalized and successfully tested locally, the next step is to deploy it to Orchestrator. In Orchestrator, there are two separate tenants: Testing and Production. Initially, we deployed the process to the Testing environment to ensure it functions correctly. After confirming that it ran successfully, we proceeded to add it to the Production environment and configured a Trigger, which defines the scheduled time for the process to run. To deploy a process from UiPath Studio to Orchestrator, it must first be published directly from the Studio interface by using the Publish button. During this step, the Package Name field is used to define the process name, and the destination environment is selected. Once the details are confirmed and the publish action is completed, the process becomes available in the Orchestrator under the Testing tenant. With the process successfully published, testing can be carried out directly in Orchestrator

by selecting the process and clicking Start. In this case, the test execution was successful, as indicated by the status update in Orchestrator shown in figure 18.

Figure 18: Successful Testing

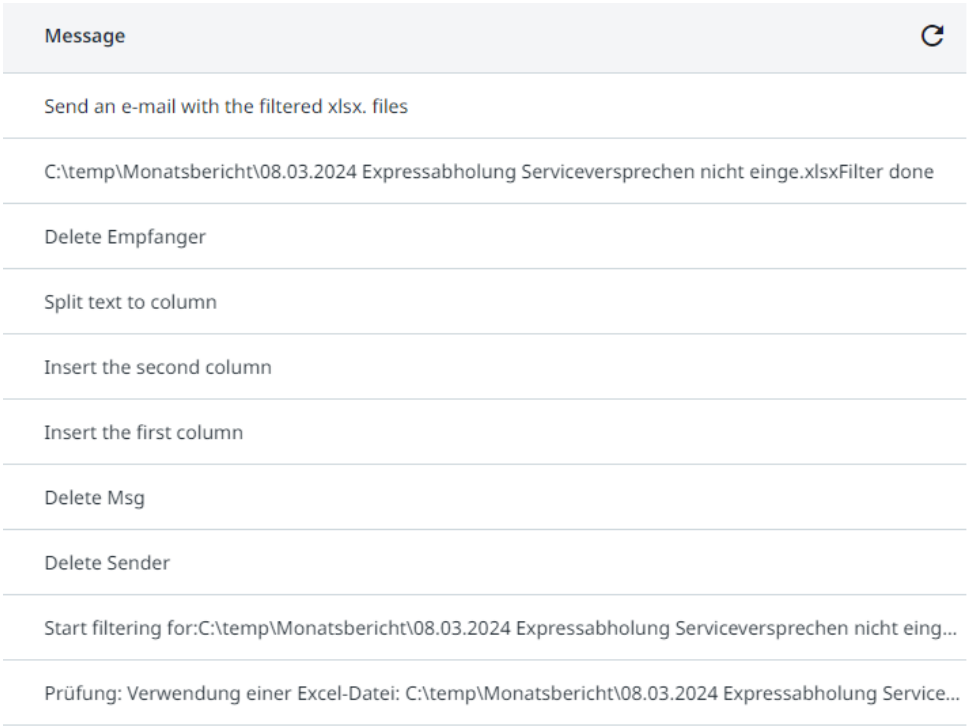


Source: Own work

Logs in UiPath play a crucial role in tracking the progress of a process and viewing its output. By analysing these logs, we can determine the bot's current status, identify the actions it has completed, and detect any errors that may have occurred during execution. This makes monitoring and troubleshooting significantly easier.

These execution logs are also accessible within Orchestrator as shown in figure 19. During testing, we reviewed the logs both in UiPath Studio and directly in Orchestrator. We incorporated detailed logging into the process to gain better visibility into its behaviour and performance. Through this, we was able to confirm that the testing was successful, and the bot sent a success email upon completing the process.

Figure 19: Logs from Orchestrator



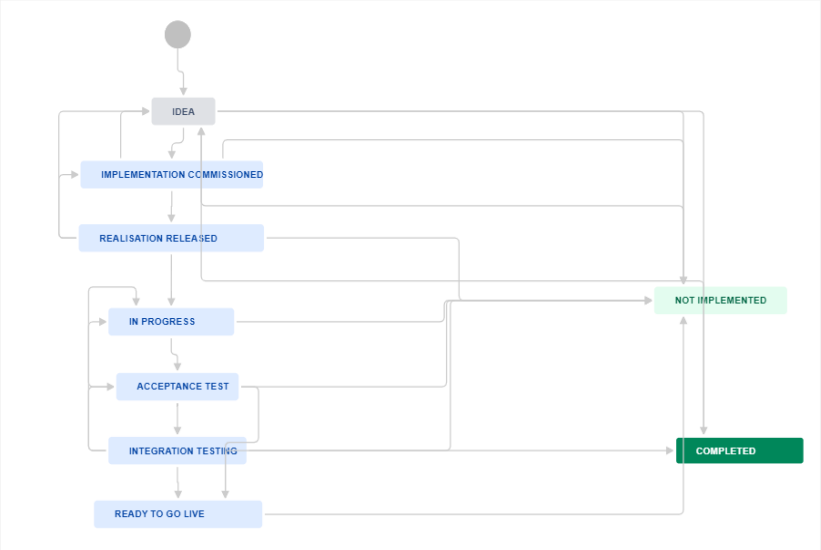
Source: Own work

The last step we did was to add the process from the Testing tenant to Production and set the trigger for the bot to run unattended. We scheduled the trigger for the 8th of every

month at 9:00 AM. Before adding the process to Production, we scheduled a final meeting with the functional team to verify the data one last time. After receiving confirmation, we made the process live in Production.

Once that was completed, we updated the Jira ticket we created at the beginning of the task, changing the workflow status from "In Progress" to "Completed." Now the Jira ticket is closed as shown in figure 20, and we can track that this task is fully completed.

Figure 20: Jira Completed



Source: Own work

6.2 Practical Implementation of Blue Prism

This section presents a practical implementation of RPA using Blue Prism within the reporting operations of the pharmaceutical company. The automation process replaces a recurring manual task that involves consolidating monthly data using Excel and Outlook, managing shared folders, and distributing KPIs via email. The implementation highlights how Blue Prism's interface and built-in components such as the MS Excel VBO and Outlook automation were used to streamline data processing, improve accuracy, and significantly reduce execution time.

6.2.1 Implementation of the Manual Process

This process involves the monthly preparation and tracking of key performance indicators (KPIs) within the logistics department, aimed at providing an overview of operational performance across areas such as customer service level (CSL), inventory accuracy, order fulfilment, and lead times. Traditionally, this required manually collecting data from various internal sources, consolidating it in Excel, organising shared folders, and

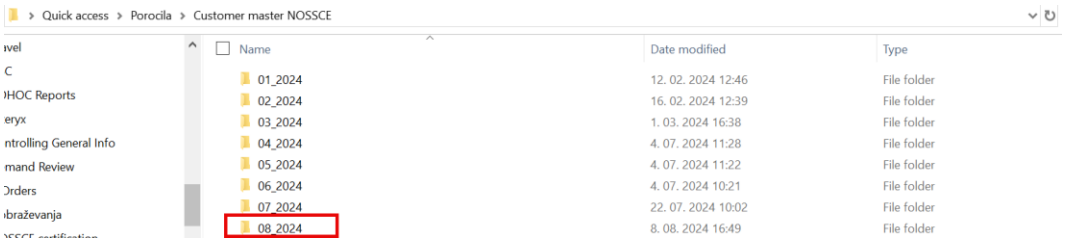
distributing reports via email. Automating this process with Blue Prism enabled the team to streamline data gathering, ensure consistent formatting, and deliver timely KPI dashboards to stakeholders. This not only reduced manual workload and execution time but also improved reporting accuracy and allowed the logistics team to focus more on performance analysis rather than repetitive administrative tasks.

The report requires preparation on a regular and monthly basis, typically beginning from the 1st of the month and extending until the 6th at the latest. This report holds significant importance and usually requires approximately 20 minutes to complete manually. The report encompasses the utilization of Excel and Outlook as essential tools for data management and analysis. Additionally, the report's data is stored and saved in the designated location known as I/Drive.

The process starts with accessing the I/Drive, where a variety of folders are stored. From there, we navigate to a specific folder called ‘Customer Master NOSSCE,’ which acts as the main repository for monthly data. Inside this folder, there are subfolders organized by month, making it easy to find what we need. Our task is to locate the most recent monthly folder, which in this case is labelled ‘08.2024.’ This folder contains the latest data we’re working with. Once we’ve identified it, the next step is straightforward: copying and pasting the folder to ensure the data is properly saved or transferred for further use.

This step is simple but important. By copying the latest monthly folder, we make sure the right data is captured and ready for the next stages of the process. Figure 21 provides a clear view of the folder structure and highlights the folder we’re working with in this example.

Figure 21: Folder Path

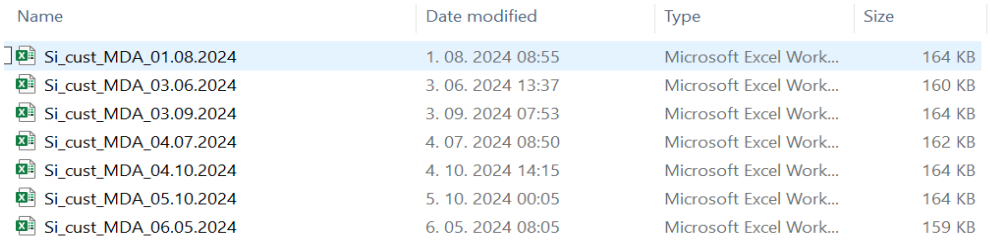


Source: Own work

Once the folder has been pasted, it should be renamed to match the current month—in this case, 09.2024. Inside the copied folder, we’ll find two Excel files. To keep the data accurate, we need to delete the file titled 'Si_Cust_MDA_' as it belongs to the previous month, and we will keep the other Excel file as a template.

After deleting the outdated file, the next step is to navigate to another folder named MDA. Here, we need to locate the Excel file for the current month—in this case, 09 for September, as we can see from Figure 22 as well. Once we’ve found the correct file, we simply copy it to proceed.

Figure 22: MDA Excel



Name	Date modified	Type	Size
Si_cust_MDA_01.08.2024	1. 08. 2024 08:55	Microsoft Excel Work...	164 KB
Si_cust_MDA_03.06.2024	3. 06. 2024 13:37	Microsoft Excel Work...	160 KB
Si_cust_MDA_03.09.2024	3. 09. 2024 07:53	Microsoft Excel Work...	164 KB
Si_cust_MDA_04.07.2024	4. 07. 2024 08:50	Microsoft Excel Work...	162 KB
Si_cust_MDA_04.10.2024	4. 10. 2024 14:15	Microsoft Excel Work...	164 KB
Si_cust_MDA_05.10.2024	5. 10. 2024 00:05	Microsoft Excel Work...	164 KB
Si_cust_MDA_06.05.2024	6. 05. 2024 08:05	Microsoft Excel Work...	159 KB

Source: Own work

We then return to our folder—in this case, '09_2024'— and paste the copied Excel file into it. At this point, we have two Excel files ready for the next steps: the newly pasted file and the existing file from the previous month, which we are using as a template. For the template, we'll simply update it with data from the current month.

Moving forward, the next steps involve working with the two Excel files. We start by opening the 'NOSSCE IC' file, which we're using as a template. Our task is to add data from the other Excel file—the one we copied from the MDA folder.

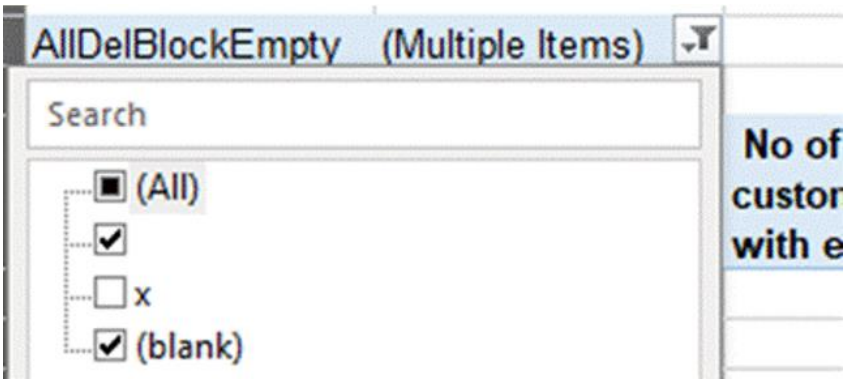
First, we focus on the 'NOSSCE IC' file. We need to delete all the data from columns A to AK. Beyond column AK, we leave the data untouched because it contains formulas that are essential for later steps.

Next, we open the second Excel file named SI_Cust_MDA, corresponding to the current month. We copy all the data, excluding the column headers, and then return to our input file to paste the data, ensuring the columns remain untouched. Once the data is pasted, we focus on column AK—the one with the formulas we previously set up. We then extend these formulas to cover all rows that contain data.

Afterward, we navigate to the "AllDelBlockEmpty" column and apply a filter to exclude rows with 'x' values, so only blank cells remain visible. At this point, we carefully review the filtered data to ensure it contains only zeros. If any '1' values were present, it would mean the KPI will not be 100%, and we would need to notify the responsible person to correct the errors for the following month while sending the KPI as it is for the current month. Typically, the data contains only zeros, resulting in a KPI of 100%. However, there have been instances where the KPI dropped to 90%. In this case, we confirmed that all the data contained zeros, ensuring a KPI of 100%.

Once we verify that the data contains only zeros, we proceed to the "MDA result" sheet. Here, we refresh the pivot table and adjust the Row Labels filter to include all entries except 'BLANK' and "AllDelBlockEmpty", as illustrated in figure 23.

Figure 23: AllDelBlockEmpty Excel



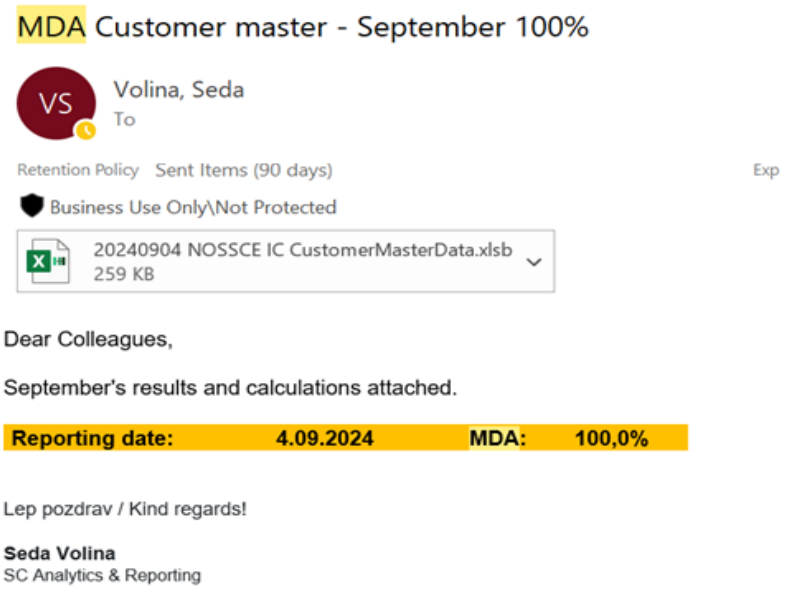
Source: Own work

On the MDA result sheet, we ensure the reporting date is updated to the current month. This date will later be copied and included in the email. After completing these steps, the results are ready for reporting. We then save and close the Excel file, renaming it to reflect the current month. For example, if the previous name was "20240804 NOSSCE," it should be updated to include the current month's date format.

The last step is to send the Excel file via email and include the reporting date along with the current KPI from the MDA result sheet. The screenshot below demonstrates how the email should look. This email must be sent to 15 responsible persons each month. For confidentiality purposes, their names have been removed in the screenshot below.

By completing this step, the process for the current month is finalized, ensuring all relevant stakeholders are informed with accurate data and MDA results.

Figure 24: Outlook Email



With this, the report is complete. As shown, the process mainly involves working with an Excel file, filtering various data points, and merging information from different Excel files. Additionally, Outlook is used to notify responsible individuals of any system errors or to send out the final Excel file.

Next, we will explore how this process can be streamlined using automation, delivering faster results compared to the manual approach.

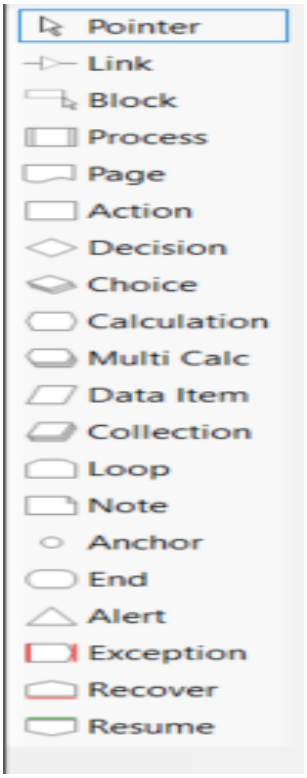
6.2.2 Developing the Bot

The interface of Blue Prism is quite different compared to UiPath. While UiPath offers a more visual and drag-and-drop experience, Blue Prism relies on its unique set of tools and symbols to represent processes and logic flows.

For instance, in Blue Prism, you'll work with elements like Process, Decision, Action, and Exception, each represented by distinct icons. These are accessible via the toolbar, as shown in Figure 25.

Unlike UiPath's "Activities Panel," where you can search and drag predefined activities, Blue Prism organizes these items more systematically with specific purposes.

Figure 25: Activities Panel in Blue Prism



Source: Own work

When designing a process in Blue Prism, every flow begins with a Start point and ends with an End point. Between these two points, we add the necessary activities to build and develop our automation logic. Each activity represents a specific action or operation that contributes to achieving the process's objective.

For our flow, the first step was to create a new folder. We used the activity named "Action", where we created the code to create a folder if it doesn't exist, and it does nothing if the folder already exists. We renamed this action to "Create Folder".

As shown in Figure 26 below, in the Expression section of this action, we used the following line of code:

Figure 26: Create Folder

```
1  System.IO.Directory.CreateDirectory(FolderPath)
```

Source: Own work

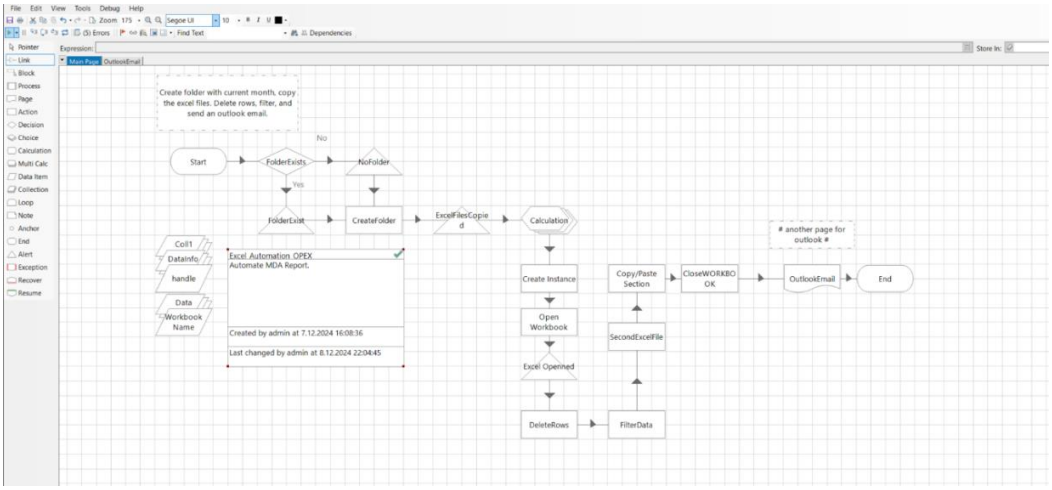
Let's break this down:

System.IO.Directory.CreateDirectory: This is a .NET method used to create a directory (or folder) at the specified location. If the folder already exists, this command simply confirms its existence without throwing an error.

Folder Path: This is an input parameter where we specify the path of the folder we want to create. In our case, we provided the location used by the entire OPEX team, ensuring that the created folder is accessible to everyone who needs it.

Once this activity is executed, the process will automatically create the specified folder in the shared drive, making it a seamless and efficient way to handle directory creation.

Figure 27: Process Flow



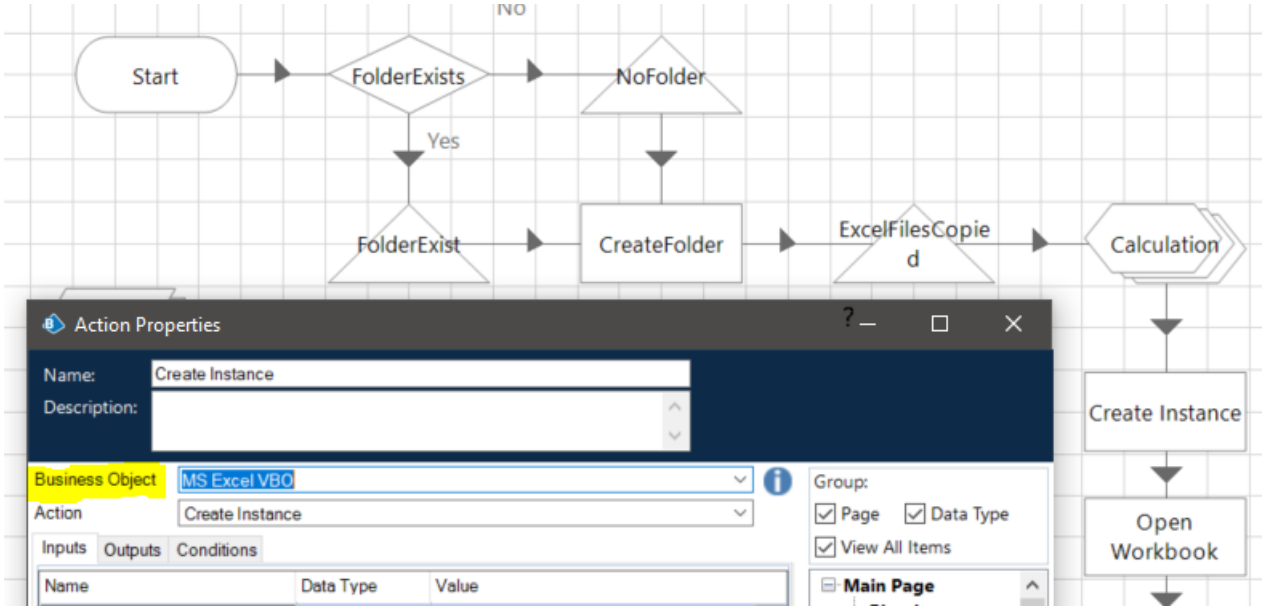
Source: Own work

As we can see from Figure 27, the overall process structure is clearly outlined. The upper part of the flow provides a brief description of what the process aims to accomplish, offering a concise overview for anyone reviewing the diagram. This short description acts as an introductory summary, which helps clarify the overall objective of the automation. In this case, the purpose of the process is to manage monthly report preparation, leveraging tools like Excel and Outlook.

The part of the process below the description, where we see the approved green, is related to the Control Room. This part of the process will be explained in more detail later, but it's important to note that the green-approved areas represent parts of the flow that are directly tied to Blue Prism's Control Room, which handles the execution and monitoring of the bot's operations. After the folder has been created (as we discussed earlier), the next step is for the bot to copy the necessary Excel files into the newly created folder.

Once the Excel files have been copied, the process enters the next stage, starting with 'Create Instance' and continuing until 'Close Workbook'. In this segment of the process, from Create Instance to Close Workbook, the automation focuses exclusively on working with Excel files. If we open one of these activities in the Properties Panel, we can see that the Business Object is defined as MS Excel VBO, as shown in Figure 28.

Figure 28: MS Excel VBO



Source: Own work

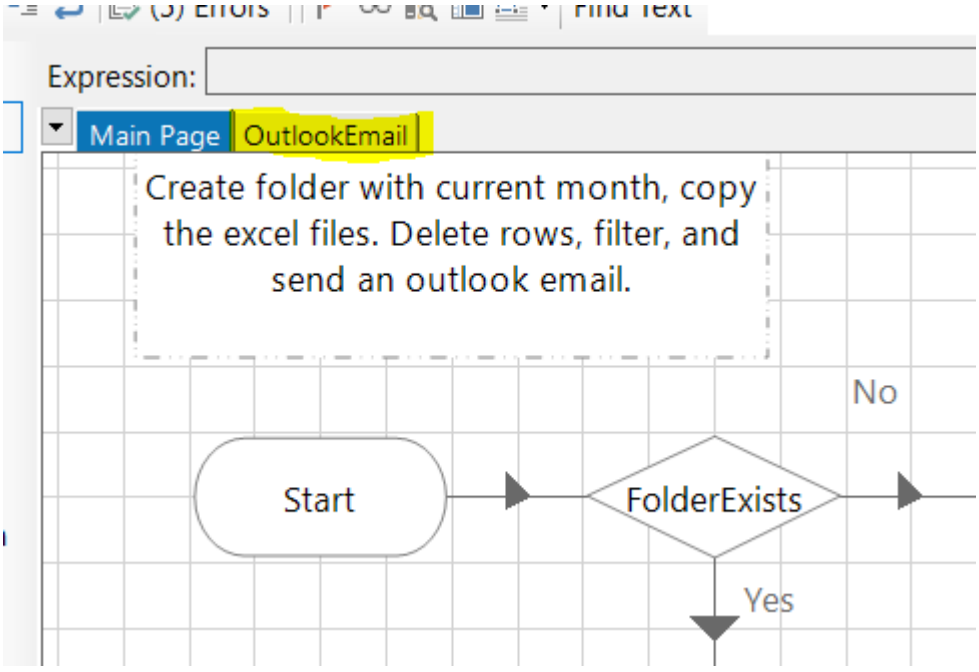
The MS Excel VBO is a pre-configured component in Blue Prism that contains a set of actions for automating tasks within Excel, including opening files, writing data, applying formulas, and saving the final document. By utilizing this object, the automation can seamlessly manage Excel files throughout the workflow.

The flow continues by performing several operations including filtering, deleting, copy/pasting activities. Once all the changes are made to the Excel file, the final step in this section is the 'Close Workbook' action. This is simply where the bot saves all the work it's done and closes the workbook.

The final step of the process involves sending an Outlook email to the relevant recipients. This action is handled separately in the process flow, appearing in a distinct section following the Main Page. Once the email is successfully sent, the automation process is considered complete. With the bot running this task, the entire process takes approximately 1 minute and 30 seconds to complete.

Subsequently, we coordinated a call with the functional area team to verify that the automation was performing as expected and to ensure their satisfaction. Upon receiving confirmation that everything was functioning correctly, we arranged a follow-up call with the forum. After conducting a thorough review and control process, the forum confirmed that everything was in order, and we were ready to proceed with adding the process to the Control Room for testing.

Figure 29: Outlook Email



Source: Own work

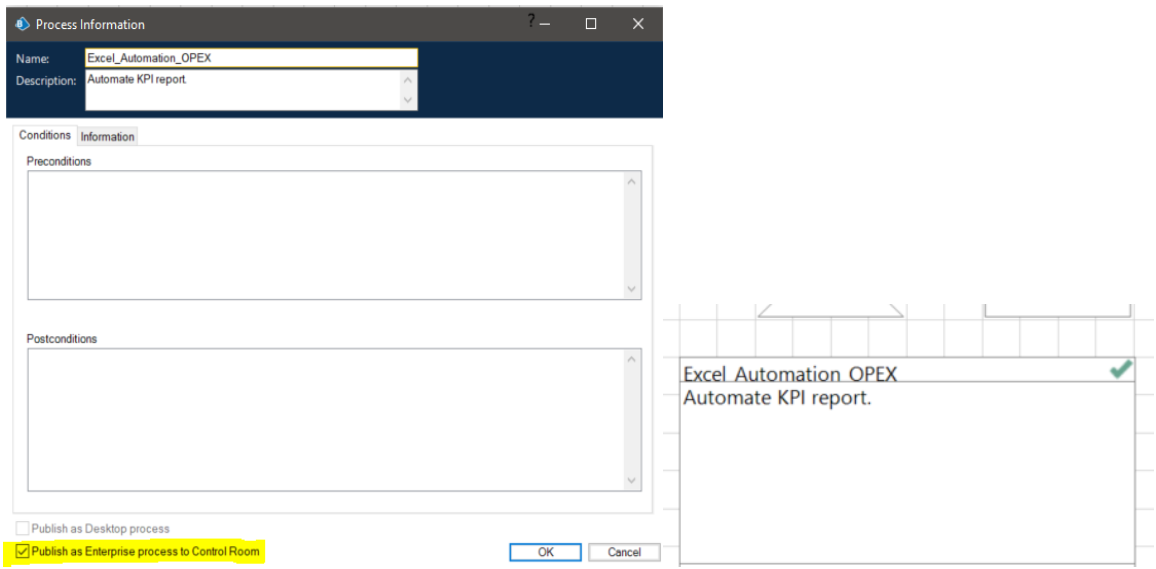
6.2.3 Control Room

In terms of the interface, Blue Prism's Control Room and UiPath's Orchestrator differ quite a bit. UiPath's Orchestrator is web-based, which means you access it through a web browser. This setup requires an internet connection and often involves a more complex configuration, including setting up a web server and ensuring continuous online connectivity.

In contrast, Blue Prism's Control Room is integrated directly into the Blue Prism desktop application, so you interact with it within the same environment, without needing additional setup. This makes Blue Prism simpler and more user-friendly, as everything is contained in one app, allowing easy monitoring and management of your bots. Overall, Blue Prism provides a more streamlined approach to managing automation, offering ease of use without the extra complexity that comes with UiPath's web-based Orchestrator.

Publishing a process to the Control Room is a straightforward task. We selected the Excel Automation Opex process, which triggered a window displaying the description. After reviewing the details, we clicked Publish to Control Room. Once the process was successfully published, a green check mark appeared in the description section, indicating that the process had been published. When publishing from the Main Page, all associated subpages, such as the Outlook email configuration, are automatically published as well. Figure 30 shows the window during the publishing process and how it appears after publishing, which is quite clear and easy to understand.

Figure 30: Publish Process to Control Room



Source: Own work

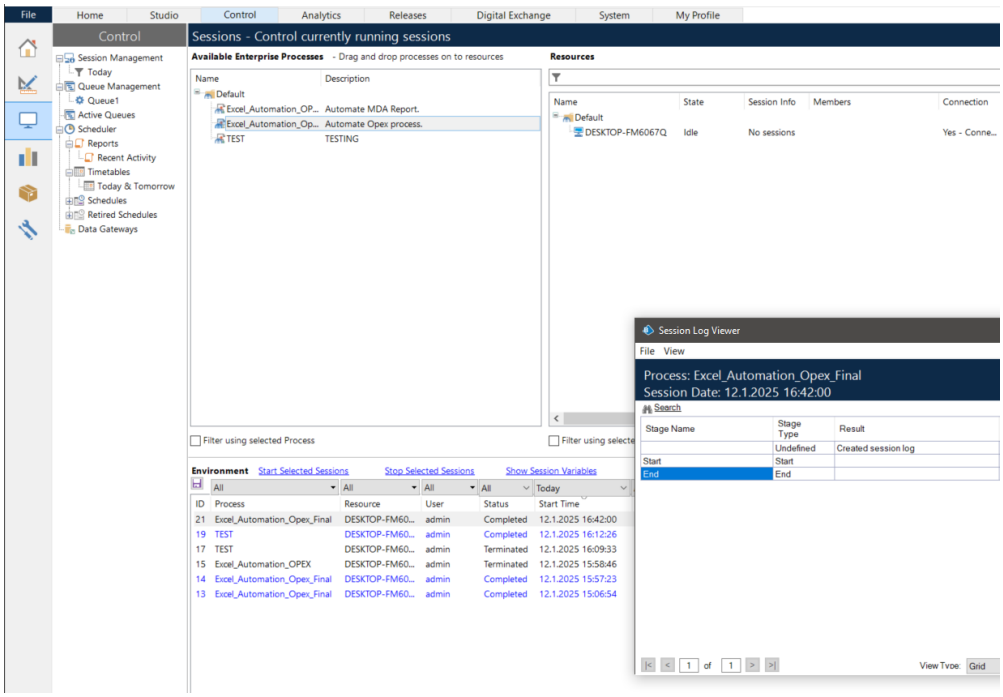
6.2.4 Process Testing in the Control Room

As seen in the screenshot, the Control Room displays all the processes that have been added to the system. On the left-hand side, you can see a timeline, which allows us to schedule and run processes, similar to the functionality found in UiPath's Orchestrator. However, unlike UiPath, where the logs are more clearly presented in a user-friendly format, Blue Prism logs are a bit more simplified. The logs in Blue Prism primarily show high-level information such as Start and End times of the process execution.

To access more detailed logs, you need to double-click on a specific process in the Control Room. This opens up the Session Log Viewer, where you can see detailed steps, statuses, and results of the process execution (e.g., completed, terminated, etc.). In UiPath, the logs are typically more visible and provide instant access to more detailed step-by-step information, while in Blue Prism, this detailed logging requires a few extra steps to access.

Running the process in Blue Prism is also different from UiPath's Orchestrator. Instead of simply clicking Start as in Orchestrator, you need to drag and drop the activity (process) onto the designated machine (PC) within the Resources section. This action schedules and triggers the process to run on the selected resource. After testing and running the process successfully in the Testing environment, we moved it to Production. This transition was managed by the Forum, as we had less experience with the production environment setup. The Forum provided valuable support, testing, and ensured that the process was running smoothly in the production environment.

Figure 31: Control Room



Source: Own work

Due to the sensitive and confidential nature of the data, additional screenshots related to the logs and the production environment will not be shared. This is to ensure the privacy and security of the information involved in the process.

7 ANALYSIS OF THE CASE

This chapter presents the main findings from the interview conducted with the respondent who are the employees of the two companies specifically in their logistics department as well as their team of RPA developers, to understand how they go about implementing automation in their processes. We focus both on the logistics employee and RPA developers in order to gain absolute insight into how automation is being developed, it challenges during development and also to know it benefit and challenges once it has been deployed to the functional areas in this case the logistics department of both companies, this analysis would enable us provide answers to the research questions

7.1 Retail Company: UiPath Implementation

7.1.1 Theme 1: Efficiency and Productivity Gains

The respondents shared their experiences in developing and implementing RPA, when asked whether automation has boosted their productivity, increase efficiency and its overall benefits, all of the respondents had a positive opinion about automation. They unanimously expressed that implementing UiPath has enable them to redirect their focus toward critical and value adding task which has enhanced overall operational effectiveness.

The respondents explained that since the implementation of UiPath, there has been a notable change in their task delivery as automation has increased their efficiency level and also injected speed into operations that are repetitive and routinized in the department.

All of the respondent in the retail company explained that they are satisfied with the outcome of automation in their department, they explained that tasks that they execute manually before automation are easily executed with automation, and all of the respondent highlights that automating process is significantly faster that their manual way of carrying out task. Respondent 1 described that “automation is highly efficient and impactful on process” he added that it has allowed them to “save a significant amount of time to focus on other tasks” and has a result their productivity level has increased. Respondent 4 also described that automation of processes showed “how much time and effort bots can save while still being reliable”.

In terms of job satisfaction, developers and personnel across functional areas noted a positive shift. Automation has simplified tasks, allowing employees to focus on more

strategic and productive activities. This shift has contributed to higher morale and an enhanced sense of job satisfaction

It is evident that the role of automation in the logistic department is highly essential, it has enabled the employee focus more on strategic task and save a lot of time on executing repetitive and routinized task. Automation has also injected speed and accuracy into the overall workflow in the department ensuring that tasks are carried out in time and has also reduced errors. The integration of automation has clearly positioned the department for greater operational efficiency and success.

For instance, a task that previously required 10 minutes to complete manually is now performed by the bot in just 1 minute. Through the implementation of automation, the company achieves a monthly time saving of approximately 9 minutes per execution. Over the course of one year, this results in a total time saving of 108 minutes, equivalent to 1 hour and 48 minutes.

The findings that RPA led to increased speed, reduced manual effort, and improved task accuracy directly relate to the theoretical claims by Aguirre and Rodriguez (2017) and Syed et al. (2020), who emphasised that RPA contributes significantly to process efficiency and organisational productivity by automating high-volume, repetitive tasks.

7.1.2 Theme 2: Training and Skill Gaps

The respondents highlight their lack of formal training before the implementation of process automation although most of them admitted that they are aware with the concept of RPA and they are quite familiar with UiPath automation tool.

Respondent 1, a Supply chain and Logistic specialist explained that they had some concerns with how the automation would turnout stating that “we were sceptical about how the bot would perform because the data was taken from SAP, and we were concerned about potential issues or incorrect actions that could lead to bad outcomes” and this was due to the lack of awareness and capability of the tool. However, he further explained that the RPA developers explained the what automation is all about “after consultations with the RPA team, who not only helped with the development but also clarified that they had a testing environment, we were reassured”. The respondents also mention that no formal training was conducted to ease them into the world of process automation, as mentioned by respondent 2 availability of more training resources would have made the transition a lot easier as “it took a while for them to familiarize themselves with the whole process”.

This shows that organizing formal training for employees would help their transition into automation which would enable them familiarize with the software, it is important to point out that in as much as the employees complained about not receiving formal

training, they seem to adapt easily with process automation highlighting the simplicity of UiPath user-friendly interface.

This is consistent with Syed et al. (2020), who highlighted that ease of integration and tool-user alignment are critical factors in effective RPA implementation.

7.1.3 Theme 3: Collaboration and Communication Issues

The logistics team highlights that collaboration with the RPA developer team posed a bit of concern for them, they explained that they were unsure of what information and documentation would be require from them in order to comment the automation process.

Respondent 2 explained that "the biggest challenge for our team was the collaboration at the beginning", Respondent 3 also confirmed this by saying "Initially, we were unsure about how the collaboration would go. It took us a while to understand the type of information that was expected from our side". However, they explained that they were able to comprehend the requirement of the process through the help of the RPA developer team, this created a back and forth and regular check-ins between the department to address the early-stage challenge

The RPA developer team pinpointed that better communication with the logistic department would have made the implementation process a lot easier, this challenge stems from the fact the logistics personnel are relatively new with automation but after proper sensitization with the logistics department, Respondent 4 an RPA developer explains that "This collaboration taught us a lot about how things are done manually versus with automation. Seeing the manual process helped us understand the details and challenges, which made it easier to design a bot that works smoothly and safely", he also added that *"*Clear communication with stakeholders, especially around access requirements, is critical to avoid delays"

This shows that collaboration and communication posed a challenge during the early stage of the automation process. The logistics team faced uncertainty regarding information and documentation required to initiate the process, which delayed effective collaboration, regular check-ins and iterative feedback between the department help resolved the challenge which highlight the importance of effective communication and collaboration early in the implementation process so as to align expectation and bridge gaps.

The importance of detailed and structured documentation mentioned by respondents confirms theoretical insights from van der Aalst et al. (2018), who argued that clearly defined workflows and process standardisation are essential for successful automation design and deployment.

7.1.4 Theme 4: Tool Suitability and Implementation

The respondents highlight the user-friendly aspect of UiPath automation, they explained that it took little or no time to understand the functionality after the sensitization with the RPA team which is all down to the intuitive design of UiPath.

Respondent 1 pinpointed that "UiPath was significantly faster and easier to work with" he added that the assurance from the RPA team and other department in the organization boosted their interest in exploring UiPath and in the end the department achieved all the intended benefit from automating their process.

On the part of the RPA developers, questions were posed on how the department determine the suitability, reliability and accuracy of bots when automating complex process, they explained that they utilize the bots in a series of testing environment before deploying them into production. Respondent 5, an RPA consultant explained that "Before moving to production, we always start by testing in the testing environment from our local PCs. If everything runs smoothly, the next step is to add it to the orchestrator in the testing environment. Once it's successful there, we proceed to production. We never take the final step without ensuring everything works perfectly", respondent 4 who is an RPA developer added that "To ensure reliability and accuracy in bots' automation, we focus on robust testing, implementing fail-safes, and validating data throughout the process. Regular monitoring, scalability checks, and updates help adapt to system changes and maintain consistent performance".

This shows that UiPath user-friendly design enabled the logistics team to quickly adapt to it functionality. On the development side, the RPA developers emphasize the importance of testing to ensure suitability, reliability and accuracy of bot which should be done in a local environment before deploying the bot to production to ensure smooth and error free deployment.

The need for continuous feedback and cooperation across teams was also highlighted by Kroll et al. (2016), who emphasised that cross-functional collaboration and clear communication are essential to overcoming organisational resistance and enabling effective change management during RPA implementation.

7.1.5 Theme 5: Effective Documentation and Workflow Consideration

The respondents were asked the key criteria that that enables the effectiveness of the UiPath, they mentioned that proper documentation of process was key as it enables the RPA developer to fully understand the process of operations in the logistics department.

Respondent 1 from the logistic department explained how they kept proper documentation of their processes, he explained that "First, we used one word document,

where we did a good documentation how the process looks. Afterwards RPA team, send us one webpage that they created and we added there all the necessary data. This was linked also to Jira ticket that they were opening for each process.*"* Respondent 2 added that their visual representation of their process in form of videos also aid the automation process as it provides pictorial depiction.

Respondent 4 from the RPA developer team explained that documentation from the logistic team simplified the development of the bots, he narrated that "Seeing the manual process helped us understand the details and challenges, which made it easier to design a bot that works smoothly and safely", in as much as the documentation from the logistics team was helpful, respondent 4 mentioned that he would still "suggest starting with a detailed process analysis to identify potential roadblocks early".

This makes evident the fact that proper documentation of process is essential to navigate the challenges of the early stage, this would help the developer to easily understand the details of the process and how to solve the challenges, the RPA developer also suggested carrying out a detailed process analysis as this would even fast track the development and solve the challenges of the early stage.

Interviewees identified a lack of formal training and initial uncertainty, which aligns with Lacity and Willcocks (2016) and Aguirre and Rodriguez (2017), who stressed the importance of organisational readiness, employee training, and awareness to ensure a smooth and sustainable transition to automated processes.

7.2 Pharmaceutical Company: Blue Prism Implementation

7.2.1 Theme 1: Efficiency and Productivity Gains

The logistics team of the pharmaceutical company had a very different encounter with the implementation of Blue Prism automation tool; they shared that their lack of awareness and knowledge about automation posed a challenge initially. However, they unanimously agree that implementation of Blue Prism made their logistics operations faster.

The respondents in the logistics departed agreed that implementation of automation made their task "moderately faster" as opposed to carrying them out manually, they also highlighted the fact that their efficiency level and productivity increased, respondent 6 explained that "Until now, we handled everything manually, so the idea of automation was really exciting. As our first project, we were very happy with the results and are definitely looking forward to using RPA in our company for future projects.

This highlight the importance of creating awareness within the company to sensitize personnel about automation and most importantly to address the initial challenges that

would be encountered during implementation, the logistic team's experience with Blue Prism illustrates how automation can significantly improve efficiency and productivity. Also, it fosters personnel confidence in automation solution as they were willing to embrace RPA in future projects.

For instance, the implemented bot enabled the company to achieve a time saving of approximately 18.5 minutes per execution by reducing a previously manual 20-minute process to just 1 minute and 30 seconds. Over one year, this improvement translates into a total time saving of 222 minutes, equivalent to 3 hours and 42 minutes.

Similar outcomes were described by Aguirre and Rodriguez (2017) and Syed et al. (2020), who explained that RPA enhances organisational productivity by automating routine activities and allowing employees to focus on more strategic responsibilities.

7.2.2 Theme 2: Training and Skill Gaps

The respondents in the logistics departments express that they didn't receive any formal training on Blue Prism automation tool, and that the Opex project was the first ever automation project to be carried out in their department.

The team highlighted the fact that training very essential for them to familiarize with Blue Prism, Respondent 6 mentioned that "Another challenge was our lack of prior knowledge about RPA, as this was the first project of its kind in our company", he also suggested that "more information related to RPA" would go a long way in helping them improve future RPA projects, this was also backed by respondent 7 who suggested that "Organizing workshops to guide how to provide the required information and align processes is essential" as this would make them prepare adequately for future project.

On the other hand, the data analytic team of this organization was saddled with the responsibility of developing the automation, some of the personnel had experiences with using other automation tool specifically UiPath as explained by respondent 9 "we had some experience with UiPath, so we thought learning Blue Prism would be straightforward, but most of the team didn't know much about RPA at all." However, Blue Prism was rather too complex for them, they had to turn to company provided training to understand the automation tool, respondent 9 explained that to tackle this challenge "we took advantage of company-provided courses like Coursera and Up4Growth. After finishing the training, we started developing, and while it wasn't easy," respondent 8 also expressed the same challenge "The biggest challenge was our lack of knowledge, as it was our first time using Blue Prism. We addressed it by taking courses on Coursera, joining Up4Growth sessions, and participating in the Blue Prism forum every Tuesday and Thursday".

This reveals a significant lack of formal training and prior experience with the Blue Prism automation tool among both the logistics and data analytics teams. The logistics department, undertaking its first automation project, emphasized the critical need for training and workshops to build familiarity with RPA and improve preparedness for future initiatives. Similarly, the data analytics team, despite some experience with other automation tools, found Blue Prism complex and relied heavily on company provided training programs to develop the necessary skills while on the project.

This mirrors the perspective of Lacity and Willcocks (2016) and Aguirre and Rodriguez (2017), who emphasised the role of organisational readiness, particularly employee training and awareness, in ensuring successful RPA integration.

7.2.3 Theme 3: Collaboration and Communication

The logistics team highlighted the importance of communication with the data analytics team during the implementation of Blue Prism automation tool as it enabled them to understand the requirements.

Respondent 6, the Opex coordinator explained that "we stayed in constant communication with the data analytics team, who kept us updated throughout the process", this collaboration and constant communication helped the logistics team to familiarize themselves with what process automation is all about as well as understanding what documentation or information is required to ensure seamless implementation.

The data analytics team also described how effective collaboration and communication eased the implementation process, respondent 8 explained that "This collaboration taught us the importance of adaptability and teamwork when exploring new technologies like RPA. We learned how valuable proper training and clear communication are for overcoming challenges, especially when tackling something entirely new", respondent 9 also added that "This collaboration helped us understand RPA, its advantages, and how Blue Prism works. It also taught us the importance of effective communication and task sharing in a completely new domain"

This shows that effective communication and collaboration is highly crucial for successful implementation of process automation, both teams benefitted from the continuous engagement which facilitate the success of the implementation.

7.2.4 Theme 4: Long Implementation Time

The respondents in the logistics department explained that the waiting period for the implementation of the Blue Prism automation tool was very long but this was due to the fact that the data analytics team were learning on the job.

Respondent 6 explained that “the biggest challenge was time, as we had to wait a lot for everything to be completed”, which is also backed by the response of respondent 9 who expressed that “The finalization of the project took more time than we thought”, However this is to not be confused that Blue Prism takes a long implementation time despite its complexities, it is important to note that the data analytics team in charge of the RPA development project are relatively new to process automation as respondent 8 from the data analytics department explained “the biggest challenge was our lack of knowledge, as it was our first time using Blue Prism” as well as respondent 9 “This was the first time our data analytics team worked on an RPA project. Before this, we were mainly using Excel macros and Alteryx, and we had no real idea what RPA was”. The data analytics team suggested that to deal with the issues of long implementation time, the organization must ensure that they invest in training or and having “a team with more experienced professionals in RPA would greatly enhance the quality and speed of future projects” as explained by respondent 9.

The insights gathered from the logistics and data analytics departments highlight that the extended implementation time for the Blue Prism automation tool was primarily due to the learning curve faced by the data analytics team, who were new to Robotic Process Automation (RPA). While the delays were not caused by the tool itself, the lack of prior experience and knowledge in RPA significantly impacted the project timeline. Respondents emphasized the importance of investing in training and building a team with experienced RPA professionals to ease such challenges in the future.

7.2.5 Theme 5: Effective Process Documentation and Workflow Consideration

The logistics team emphasized the importance of proper process documentation to ensure smooth implementation of Blue Prism automation tool. The respondent highlighted how structured approach to process documentation ease automation development and deployment.

Respondent 7, a logistics officer explained that the department often rely on Microsoft word files and video recordings to document standard operating procedure. These documents provide a step-by-step guide with graphics representation that ensure clarity which enable the RPA developer fully understand the required workflows. Respondent 7 noted, “We use word files that explain the process with pictures and step-by-step instructions for clarity”. These files are then passed on to the PRA development team to commence the implementation process, this shows the importance of detailed documentation in ensuring seamless transition to automation. In addition to word file, the logistics team also utilizes video recording to capture the workflows which further ensure clarity of the processes. These videos serve as visual reference enabling the RPA team to gain a better understanding of the practical application of the workflows ensuring that the automation tool accurately mimic the manual processes.

The RPA development team confirmed that these documented materials significantly aid the bot development process. Respondent 4, an RPA developer stated that “Seeing the manual process helped us understand the details and challenges, which made it easier to design a bot that works smoothly and safely.” While the documentation was invaluable, Respondent 4 suggested that it would have been more beneficial to start with a detailed process analysis to identify any potential roadblock early on. He added: “Starting with a detailed process analysis would have helped fast track the development and address challenges in the early stages.”

This show that effective process documentation is essential for successful implementation. By leveraging on properly documented word document and video recordings, the logistics department ensures that automation developers can accurately interpret and implement workflows. This structured approach not only enhances efficiency but also reduces the risk of errors in the automation process. Organizations seeking to adopt RPA solutions, such as Blue Prism, should prioritize standardized documentation practices to facilitate seamless integration and maximize the benefits of automation.

Syed et al. (2020) discussed comparable issues, noting that the choice of RPA tool and its complexity can influence the speed and ease of implementation, as well as the learning curve for users.

8 FINDINGS AND RECOMMENDATION

This chapter presents a summary of the key findings and addresses the research question. It also discusses recommendations, highlights the research limitations, and suggests areas for further study. These findings are organized based on key themes that emerged from the interviews with the respondent from the two companies, providing insights into the implementation of automation, its impact on efficiency and productivity as well as the challenges that were encountered during the course of implementation.

8.1 Summary of Findings

One of the major objectives of this research work is to determine the benefits of RPA, finding shows that RPA has a lot of benefit that are associated to it, the implementation of RPA tools: UiPath in the retail company and Blue Prism in the pharmaceutical company has led to significant improvement in efficiency and productivity, employee from the retail company unanimously agreed that UiPath improve their overall operational effectiveness as it automated repetitive and routine task which allow the employee to focus on strategic and value added activities. This is consistent with previous findings by Guilherme (2024), who highlights that task automation enables employee focus on higher value activities by removing manual and routine work. Automation of

processes did not only increase the speed of task execution it also reduce the chance of committing errors, leading to higher accuracy in operation. As noted by Dealhub (2023), process automation reduces human error, particularly in task like data entry and financial operations which leads to a more accurate and consistent result. Employees also reported a notable increase in job satisfaction as automation has simplified their task, reduced their workload and allowed the, to engage in more meaningful task. This finding mirrors the work of Dilla et al. (2017) who stated that automation can improve employee morale by relieving them from mundane task and providing more engaging responsibility.

In contrast, the pharmaceutical company experienced a gradual improvement in efficiency after the implementation of Blue Prism, this gradual improvement reflects the observation of Matt (2023) that RPA adoption can be initially slow, particularly in environment where there is scepticism about its capabilities and potential. The logistics team had initial doubt of the capability of Blue Prism and this is due to the fact that they lack awareness of the solution automation can provide. However, as familiarity with the tool grew, employees recognized it potential to improve their operation efficiency. This mirrors the findings by Lacity and Wilcocks (2023), who pointed out that initial doubt about automation often fades once employees experience it benefit firsthand. Employee describe that Blue Prism make logistics operation moderately faster, they stressed on the importance of pre-implementation awareness and training so as to fully maximize the benefits of automation, the finding suggests that sensitization of automation before implementation will ensure a smooth and seamless transition to automation which will enhance its overall effectiveness. It is also in line with the findings of Abdel Malak (2023) who highlights that comprehensive training before automation ensures smoother adoption as employees are better equipped to utilize the new system.

One of the most significant findings across each organization was the lack of formal training prior to the implementation of RPA tools. Employees in the logistics department of the retail company were familiar with the concept of RPA and UiPath tool but they expressed concerns about the potential challenges of automation particularly regarding data accuracy and integration with existing system. This reflects the finding of Guilherme (2024), who stresses that while awareness of RPA is essential, proper training is highly important to overcome challenges that comes with integration and also to ensure smooth implementation. The absence of formal training posed a barrier that hindered smooth transition with respondent suggesting that more training resources would have ensured quicker adaptability to the new system. Despite this, employees pointed out that UiPath's user-friendly interface enabled them to adapt easily, even without formal training. Kaur (2023) supports this, noting that a user-friendly interface in UiPath can make adaptation easy, even in the absence of formal training.

In the pharmaceutical company, the logistics team faced a more pronounced skill gap as the Blue Prism automation tool was their first experience regarding RPA. This highlights a critical issue in RPA adoption identified by Malinova et al. (2014) who emphasize the

necessity of addressing skill gaps, particularly when implementing more complex tools like Blue Prism. They stressed the need for more information and training in order to adequately prepare for automation projects in future, the data analytics team who are responsible for developing the automation also struggled with the complexities despite some prior experience with automation tool like UiPath, they relied heavily on company provided training programs to build necessary skills. This finding aligns with the work of Abdel Malak (2023), who emphasizes that specialized training is crucial for handling the complexities of advanced RPA tools, highlighting the importance of investing in training and workshop to bridge skill gaps and to facilitate a smoother transition to automation especially when adopting more complex RPA tools.

Another key finding from the interviews is that effective collaboration and communication between the logistics teams and RPA developers were identified as an important factor for successful automation implementation. In the retail company, the logistics team initially faced the challenges in understanding the type of information and documentation that is required by the developers to initiate the implementation process. This uncertainty led to delays in the early stage of implementation. Epsoft (2022) found that such challenges often arise when there is lack of clarity in communication which necessitate the need for regular update and feedback loops between teams. However, regular check-ins and constant feedback between the logistics team and the RPA developers helped resolve the issues highlighting the importance of clear communication and collaboration from the beginning. This is also in line with the findings of Jeston and Neils (2014), who stress that continuous communication is critical to overcoming the implementation challenges of RPA.

In the pharmaceutical company, the logistics team and the data analytics team maintained a structured and constant communication throughout the Blue Prism implementation process, this structured communication aligns with Fingar (2017), who suggests that successful RPA implementation requires an organized, collaborative efforts between both technical and non-technical teams. The constant engagement enabled the logistics team better understand the requirement of process automation and the necessary documentation to be provided. The data analytics team also stressed the value of adaptability and teamwork in navigating the complex nature of new technology like RPA. This finding mirrors that of Trkman (2010) who argued that adaptability and collaboration are essential for overcoming the complexities associated to new technological implementations. In conclusion, the overall sentiment from each team was that effective communication and collaboration were key to overcoming the challenges posed by the implementation of RPA, ensuring successful deployment of automation in the logistics department.

The study further examined the suitability and ease of implementation of UiPath and Blue Prism, in the retail company, employees found UiPath to be highly user friendly which allowed them to easily and quickly adapt to its functionalities coupled with the support from the RPA developers ensured a seamless transition. Kaur (2023) supports this, noting

that UiPath's drag-and-drop interface allows users with little or no technical experience build automation workflows efficiently. Furthermore, the RPA developers stressed that it is pertinent to carry out rigorous testing in a controlled environment before deploying the RPA bots into production, this ensures the reliability and accuracy of the automation which reduces the risk of errors during deployment. Dumas et al. (2013) emphasize that such testing is vital for ensuring the accuracy of automation and minimizing deployment errors.

In contrast, in the pharmaceutical company RPA implementation took a longer timeline primarily due to the data analytics team's lack of prior experience with RPA. Jeston and Neils (2014) identified that implementation timelines can be extended when teams lack prior experience, particularly when adopting complex tools like Blue Prism. The team had to take training sessions and learned on the job which extended the project delivery duration. Despite the complexities of Blue Prism, the data analytic team were able to develop the necessary through training and collaboration. This experience supports the findings of Abdel Malak (2023), who advocates for investing in experienced RPA professionals to reduce implementation time and improve outcomes.

Another key finding that emerged from this research is the role of process documentation which is a crucial factor for the successful implementation of RPA in both companies. In the retail company, the logistics team maintained detailed documentation of their processes and overall workflow which helped the RPA developer's understanding of the processes, this is consistent with Malinova et al. (2014), who emphasize that clear and structured documentation is essential for successful RPA deployment. The use of visual representation such as videos and step by step instruction further aided the automation process, the RPA developer expressed that the availability of clear and documentation helped them designed the bots that operated smoothly.

Similarly, in the pharmaceutical company, the logistics department utilized video recordings and Microsoft world files to document their standard operating procedure, Dumas et al. (2013) also highlight the importance of structured documentation in reducing errors during automation, aligning with the pharmaceutical company's approach. This structure approach enabled the RPA development team to have a clear understanding of the workflow, reducing the risk of errors during automation. The findings indicate that organizations seeking to implement automation should prioritize structured documentation to ensure seamless integration and maximize the benefit of automation.

The findings shows that RPA possess transformative potential in improving efficiency and productivity within logistics departments. However, for successful implementation of automation tools like UiPath and Blue Prism, several challenges must be initially address which includes, skill gaps, the need for formal training and the importance of effective communication and collaboration. Abdel Malak (2023) and Sethi (2022) emphasize that overcoming these initial setbacks is essential for maximizing RPA's

potential. Furthermore, rigorous testing and comprehensive documentation are essential to ensure the reliability and accuracy of automated processes. Organization looking to adopt automation solutions must prioritize these factors in order to have a smooth transition and fully realize the benefits of automation.

Table 3: Summary of Themes and Findings

Themes	Main Findings
Efficiency and Productivity Gain	- RPA significantly improved task speed and accuracy. - Employees could focus on strategic tasks, boosting morale and job satisfaction.
Training and Skill Gaps	- Lack of formal training was a major challenge. - Employees relied on self-learning and company-provided courses to adapt to RPA tools
Collaboration and Communication	- Initial collaboration challenges due to unclear documentation requirements. - Regular communication and feedback resolved these issues.
Tool Suitability and Implementation	- UiPath was user-friendly and easy to adopt. - Blue Prism was complex, requiring more training and longer implementation time.
Process Documentation	- Proper documentation (Word files, videos, step-by-step instructions) was critical for successful bot development

Source: Own Work

The findings of this study emphasize the transformative potential of RPA in terms of improving efficiency, productivity and job satisfaction across both the retail and pharmaceutical companies. However, successful RPA implementation is dependent upon addressing several key factors. Efficiency and productivity gains were generally observed, with RPA tools like UiPath and Blue Prism significantly improving task speed and reducing errors, allowing employees focus in higher-value task and improving overall morale. However, these gains were not without their challenges. Both companies faced training and skill gaps sue to the lack of formal training which makes the transition to full automation somewhat slow. While employees adapted to the user-friendly UiPath, the complexities of Blue Prism necessitate the need for additional training and time for the data analytic team to familiarize themselves with the tool.

Furthermore, the study highlights the importance of collaboration and communication throughout the RPA implementation process. While the retail company faced initial setback in understanding documentation requirements, regular communication and feedback helped resolved these issues and enabled smoother implementation. Similarly,

effective collaboration in the pharmaceutical company allowed for better process understanding, leading to more accurate bot development. These efforts were essential in overcoming early-stage challenges such as misalignment of expectation and communication barrier between the logistics and RPA development teams.

Documentation was identified as a critical element for successful RPA implementation. Proper process documentation such as step-by-step guides and visual aid like video, helped RPA developers understand workflow of the logistics department more effectively which reduced errors during bot development. However, in some instances, the lack of detailed process analysis contributed to delays and challenges which highlights the importance of thorough pre-implementation process documentation.

In terms of tool suitability, UiPath was found to be highly user friendly, which allowed employees to quickly adapt to its functionalities. On the other hand, Blue Prism's complexities required more training and a longer implementation timeline. The importance of rigorous testing in controlled environment before deploying the bots was also emphasized across both companies to ensure reliability and accuracy. Despite the complexities associated with Blue Prism, the pharmaceutical company saw a positive shift in mindset towards RPA after experiencing its benefits, and employees expressed greater confidence in future RPA projects.

These findings are closely connected to the theoretical part of the thesis, particularly the RPA Roadmap illustrated in Figure 4, which outlines key stages and focus areas essential for successful automation.

The challenges identified by respondents, such as employee resistance, lack of awareness, and uncertainty during implementation, reflect the initial stages of the roadmap where change management and communication are essential.

The emphasis on training and internal support also aligns with the roadmap's preparation and readiness phase.

Finally, the interest in the future expansion of RPA confirms the final stage, which focuses on scaling and continuous improvement.

Table 4: Benefit and Challenges of RPA Based on the Findings

Category	Benefits	Challenges
Efficiency	**Increased speed of task execution:** Automation significantly reduced the time required to complete repetitive tasks.	**Long implementation time:** In the pharmaceutical company, the Blue Prism implementation took longer due to the learning curve of the data analytics team.
	Faster operations: Both UiPath and Blue Prism made logistics processes "moderately faster" compared to manual methods.	**Initial scepticism:** Employees were unsure about the reliability of bots, especially when handling data from systems like SAP.
	Reduced errors: Automation improved accuracy in task execution, minimizing human errors.	
Productivity	**Focus on strategic tasks**: Employees could redirect their efforts toward value-added activities, enhancing overall productivity.	**Skill gaps:** Employees lacked formal training, which slowed down the transition to automation.
	Higher job satisfaction: Automation simplified tasks, leading to improved morale and job satisfaction among employees.	**Learning curve:** The data analytics team in the pharmaceutical company had to learn Blue Prism on the job, delaying the project
Collaboration	**Improved teamwork:** Regular communication and collaboration between logistics teams and RPA developers helped resolve early-stage challenges	**Initial communication barriers**: The logistics team was unsure about the information and documentation required for automation, causing delays.
	Better understanding of processes: Collaboration allowed RPA developers to gain insights into manual workflows, leading to more effective bot design.	**Misalignment of expectations:** Early-stage collaboration was hindered by a lack of clarity on roles and responsibilities.
Training	**Adaptability:** Despite the lack of formal training, employees adapted to UiPath due to its user-friendly interface.	**Lack of formal training:** Employees in both companies expressed the need for more structured training to ease the transition to automation.
	Skill development: Employees in the pharmaceutical company gained RPA knowledge through company-provided training programs (e.g., Coursera, Up4Growth).	**Complexity of tools**: Blue Prism was perceived as complex, requiring additional training for the data analytics team.

Table continues

Continued

Documentation	**Effective process mapping:** Proper documentation (e.g., Word files, videos) helped RPA developers understand workflows and design bots more effectively	**Incomplete documentation:** In some cases, the lack of detailed process documentation slowed down the automation process
	Reduced errors: Clear documentation minimized misunderstandings and ensured accurate bot implementation	**Need for process analysis:** RPA developers suggested that more detailed process analysis upfront could have prevented roadblocks.
Tool Suitability	**User-friendly tools:** UiPath was praised for its intuitive design, allowing employees to quickly adapt to its functionalities.	**Tool complexity:** Blue Prism was found to be more complex than UiPath, requiring additional training and effort to master.
	Reliability: Rigorous testing in controlled environments ensured that bots were reliable and accurate before deployment.	**Testing requirements:** Ensuring bot reliability required extensive testing, which added to the implementation timeline.
	Increased confidence in automation: Employees in the pharmaceutical company expressed enthusiasm for future RPA projects after seeing the benefits of Blue Prism.	**Lack of awareness:** Employees in the pharmaceutical company initially lacked knowledge about RPA, which created scepticism and resistance.
	Positive shift in mindset: Automation fostered a more positive attitude toward technology and innovation.	**Need for sensitization:** More awareness campaigns and pilot projects could have eased the transition to automation.

Source: Own Work

8.2 Recommendations

Based on the findings of this research, the followings recommendations are suggested to streamline and ease the implementation of RPA in organization especially within logistics department. The recommendation address challenges identified in this study and also aim to provide a structured approach on how to get the best out automation while also ensuring that employees experience smooth transition to automation.

Conscious effort on the part of the company has to be taken to invest in comprehensive training programs for their employees before implementing RPA tools, the training should cover both the theoretical part of RPA and also the practical part particularly on the automation tool that the organization is intending to implement. This would enable employees understand the capabilities of automation, reduce initial doubt and build confidence in the technology. In addition, Organization should provide ongoing training

opportunities for employees which can be in form of workshops, online courses and access to RPA forum, this would help the, navigate the complexities of most RPA tool and also enable employee to be abreast of new development about RPA and also improve their proficiency with the automation tool over time. Also, Cross functional training between logistics team and RPA developers should be encouraged so as to enable all personnel to understand the technical requirements of automation and also to enable developers better understand the operational challenges that is faced by the logistics team.

Communication must be well established between the logistics team and the RPA developers; proper communication channel must be set up from the beginning of the automation project which would typically include defining the roles and responsibilities of each team and clearly mapping out the types of information and documentation that is required for the implementation. Also, regular check-ins and reiterative feedback must be encouraged between the logistics team and the RPA developers so as to help resolve any challenges that may ensue in the early stage of the project and also to ensure that both teams are on the same page throughout the implementation of RPA. Furthermore, collaborative workshop should also be organized to enable the team work together in the area of process mapping, identify potential bottlenecks and design automation solutions. This would ensure that the automation aligns with the operational needs of the logistics department.

Documentation of processes should be standardized in the organization particularly for processes that are very suitable for automation, the documentation should include detailed step by step instructions, visual representation that can be in form of flowchart and videos, as well as clear description of what each task entails, this would help RPA developers understand the workflow of the logistics department and design bot that would operate optimally and accurately. Furthermore, to facilitate effective alignment with the RPA developer, organization must ensure that a centralized document repository is created that would be accessible to both the logistics and RPA developers to ensure that both teams have access to update information while also mitigating the risk of miscommunication. Also, process analysis must be carried out before the implementation of automation to evaluate the existing workflow, this would help identify challenges and areas for improvement ensuring that automation id designed to addresses the identified challenges effectively.

Rigorous testing and quality assurance must be carried out in a controlled environment before the deployment of bots into production, this would enable the RPA developer identify and address issues before the bots are used in live operation. In addition, fail safe measures and data validation must be incorporated in the automation process in order to ensure reliability and accuracy, regular monitoring should be carried out in order to adapt to any system change and also to maintain consistent performance. Also, it is also important to carry out scalability evaluation in the early stage so as to ascertain that the automation solutions are scalable and can handle increased workload as the organization

grow, this would help prevent future bottlenecks and ensures that effectiveness of automation in the long term.

The need for experienced RPA personnel cannot be overemphasized especially for organization with a sizeable operation, employing experienced RPA developers would reduce implementation time and also improve the overall quality of automation projects. These individuals would bring valuable expertise and insight as well as guiding employees throughout the implementation process.

Internal awareness about the benefits of automation must be conducted within the organization to educate employees on how to maximize capability of automation as well as assuring them that automation bot is not designed to take over their jobs or to replace them but to help them become more efficient and productive, this awareness would eliminate the resistance to change and encourage a more positive attitude toward RPA implementation. Awareness can be done by initiating a small-scale pilot project to demonstrate the capabilities and effectiveness of automation, this can serve as proof of concept which would also help in building momentum for larger scale automation project in the organization.

Continuous monitoring of RPA solution must be carried out after the successful deployment of RPA bot, this is to ascertain whether or not the performances of the bots are meeting the desired outcomes, the monitoring would include tracking KPIs such a task completion time, error rated and overall employees' satisfaction. In addition, RPA developers must prioritize and collect feedback from the end users who in this case are the logistics team, this feedback would enable them identify issues and areas that requires improvements and it will also be used to enhance and optimize the automation processes over time. Also, a post implementation review process must be conducted to ascertain whether or not the automation project was a success, this would also reveal whether the all objectives that was set for the automation project was met, the review would also provide lesson learnt and provide recommendation for future automation project.

RPA must be aligned with organization strategic goals, this ensures that everything automation related is done in line with the overall objective of the organization which essentially included improving customer satisfaction, reducing operational cost as well as improving their competitiveness in their industry. Furthermore, it is also essential to develop a long-term automation strategy that outlines the organizational goals for automation, processes that that should be automated as well as the expected outcomes, regular review must be conducted on this strategy to reflect changes in the needs of organization and technological advancement.

By implementing these recommendations, organization can maximize the benefit of automation as well as overcoming the challenges that are associated with its implementation.

8.3 Limitations

While this study provides meaningful insights into the implementation of Robotic Process Automation (RPA) within logistics operations, it is important to acknowledge several limitations that may have influenced the scope, depth, and general applicability of the findings.

One of the primary limitations is the limited sample size. The study was conducted in only two companies, each from different industries, which restricts the ability to generalise the results across a broader range of sectors or organisational types. Both companies had specific internal structures, operational priorities, and levels of technological maturity that shaped the way RPA was introduced and utilised. As a result, the conclusions drawn from these cases may not be fully representative of the broader logistics sector or applicable in companies with significantly different characteristics.

Another limitation is the reliance on qualitative data collected through semi-structured interviews. While this method allowed for in-depth exploration of individual experiences and perceptions, it also introduces a level of subjectivity. Participants may have shared perspectives influenced by their roles, personal expectations, or organisational culture, and their accounts may not reflect the full picture of the implementation process or its long-term effects. Additionally, since the interviews relied on human memory and interpretation, there is a possibility of incomplete or biased information being provided, especially regarding technical details or performance measurements.

The scope of the study was also intentionally limited to internal logistics processes. It did not explore how RPA might influence or integrate with third-party logistics providers, external partners, or the broader supply chain. In many real-world scenarios, logistics operations are interconnected and extend beyond the boundaries of a single company. Excluding these dimensions limits the ability to evaluate the full potential or challenges of RPA in more complex, cross-functional logistics environments.

Despite these limitations, the study offers valuable insights into how RPA can affect logistics operations, particularly in terms of efficiency, employee perceptions, and organisational readiness. Acknowledging these limitations helps to frame the findings appropriately and provides direction for future research. Further studies could include a broader sample of companies, apply mixed-method approaches that combine qualitative and quantitative data, and explore the long-term impact of RPA across full supply chain ecosystems.

8.4 Suggestion for Further Research

The findings of this research thesis provided valuable insights into the implementation of RPA in logistics processes focusing on the two leading automation tool which are UiPath and Blue Prism. However, with the rapid growth in the world of automation, there are several areas that need to be explored and investigated in order to fully ascertain the capabilities of RPA, further research can build on this study by exploring the incorporation of AI with RPA in logistic, this can focus mainly on the opportunities, challenges and potential challenges that could be encountered.

One of the interesting are to focus on specifically is the application of AI automation in logistics workflows. It is a general knowledge that RPA is highly effective in automating routine and rule-based task, but with the combination of AI, RPA can evolve to handle unstructured and more complex task that requires decision making, carry out research that is based on uncovering how AI-enabled RPA can improve efficiency and adaptability of logistics operations would be a valuable contribution to the field.

Furthermore, the challenges of Incorporating AI with existing automation tool like UiPath and Blue Prism can also be explored and investigated, organization looking to adopt the combined technologies may face technical, financial and operational challenges, future research can explore what its cost to implement AI-RPA integration, extensively describe the best practice and approach, as well as the level of expertise required for successful implementation, a comparative analysis of how this combined technology are adopted in different industries and an in-depth analysis of the industry specific challenges and benefit of the technologies.

Addressing these research gaps will contribute to a more comprehensive understanding of how emerging technologies can further enhance operational efficiency and decision-making in logistics.

9 CONCLUSION

The implementation of RPA in logistics is an opportunity for organization to improve their operational efficiency, minimize cost and streamline their operation, The goal of this study was to explore these opportunities, specifically evaluating the impact of RPA on logistics processes in two selected companies it also successfully examined the benefits and importance of RPA in logistics process as well as the comparative analysis of the leading RPA tools, UiPath and Blue Prism providing an in-depth analysis and challenges associated with the implementation of RPA, this research has shown that RPA offers significant improvements in productivity and operational effectiveness. However, the successful implementation of RPA is dependent on several key factors which include process selection, employee training, tool suitability and overall organizational readiness.

The findings pinpointed that repetitive and rule-based logistics processes can be effectively automated by RPA, processes such as inventory management, order processing, shipment tracking, invoice management and customer communication, manual intervention from human employees has been eliminated by RPA reducing human errors, fast tracking process execution and improving overall service quality and delivery to customers. In Addition, RPA enable organization to make informed decision based on its real time tracking and reporting capability which gives better insight into logistics and supply chain operations. This study also emphasizes that the implementation of RPA within logistics operation can significantly save cost and allow personnel to focus on higher value tasks that requires complex decision making.

Despite the numerous benefits of RPA, the study identified several challenges organization encounters when implementing RPA in their logistics operations. These include the challenges faced when integrating RPA with legacy system, the need for initial significant investment, employee resistance to change and the requirement for continuous maintenance and monitoring. Furthermore, As RPA bots interact with sensitive business data, there is a concern for data security which necessitate a need for strong cybersecurity measures. Additionally, choosing the right RPA tool is a very crucial decision to make for organization, as the study found that UiPath is more suitable for businesses seeking a user-friendly interface and faster implementation while Blue Prism offers advanced security and scalability that are perfect for larger organization with complex automation needs.

Organization must adopt a structured approach to RPA implementation in order overcome these challenges which involves thorough process analysis, strategic tool selection and comprehensive training programs for employees. A seamless transition to automation is dependent on the involvement of various stakeholders for different departments and making sure that the business team and IT collaborate effectively. Additionally, companies can maximize RPA deployment and attain long-lasting result by implementing a phased implementation strategy with continuous performance evaluation. Organizations can further improve their automation methods and adjust to changing business requirements with the support of routine audits and feedback loops.

This research adds to the existing knowledge on RPA in logistics by offering practical insights into how it is adopted and its effects. It also points out the necessity for future studies to examine the long-term impacts of RPA on workforce dynamics, job roles, and employee morale. Furthermore, future research should look into the possibilities of combining artificial intelligence and machine learning with RPA to create more adaptive and intelligent automation solutions. Understanding the specific differences in RPA implementation across different industries will help in developing customized frameworks that tackle unique operational challenges, ensuring organizations can fully leverage the advantages of automation.

In summary, while RPA may not be a universal solution but its strategic implementation in logistics can lead to significant efficiency improvements and operational effectiveness. By tackling the challenges identified and applying best practices, organizations can fully utilize RPA's potential to stay competitive in an increasingly digital business environment. With a well-structured and continuously evolving automation strategy, businesses can achieve greater flexibility, improve customer satisfaction, and open up new avenues for innovation and growth.

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APPENDICES

Appendix 1: Povzetek

V tej raziskovalni nalogi je obravnavana implementacija robotske procesne avtomatizacije (RPA) v logističnih procesih dveh izbranih podjetij, ob hkratni primerjavi funkcionalnosti orodij UiPath in Blue Prism kot vodilnih orodij RPA. Raziskava proučuje koristi, izzive in rezultate uvedbe RPA v logistiki ter se osredotoča na raziskovalna vprašanja, povezana z izboljšanjem operativne učinkovitosti in izzivi pri izbiri ter implementaciji RPA orodij.

Raziskava uporablja kvalitativno metodologijo študije primera, ki združuje primarne podatke, zbrane s polstrukturiranimi intervjuji z logističnimi in RPA ekipami, ter sekundarne podatke iz znanstvene literature in poročil iz industrije. Rezultati raziskave kažejo, da RPA izboljšuje operativno učinkovitost, zmanjšuje število napak in omogoča zaposlenim, da se osredotočijo na strateške cilje. Pri implementaciji RPA so se pojavili številni izzivi, kot so pomanjkanje znanja zaposlenih, njihova nepripravljenost na spremembe, potreba po obsežnem usposabljanju ter ustrezni dokumentaciji. Orodje UiPath se je izkazalo za hitrejše pri implementaciji in bolj dostopno za uporabnike v primerjavi z orodjem Blue Prism, ki pa nudi napredne možnosti razširljivosti in varnosti, kar je idealno za velika podjetja.

Raziskava podaja praktična priporočila za organizacije, ki načrtujejo uvedbo RPA, in poudarja ključno vlogo vključenosti deležnikov ter nenehnega izboljševanja procesov in spremljanja uspešnosti. Avtorji priporočajo nadaljnje raziskave o tem, kako lahko umetna inteligenca v kombinaciji z RPA dodatno izboljša avtomatizacijo logističnih procesov. Raziskava prispeva k obstoječemu znanju o RPA in nudi praktične smernice za uvajanje ter okvir za implementacijo v logistični industriji.

Appendix 2: **Interview Questionnaire for Logistics Personnel**

1. Are you satisfied with the RPA outcome?
2. Before the implementation of UiPath in your processes, were you aware of the concept and capabilities of UiPath?
3. Were employees provided with any specific training or orientation related to UiPath prior to its implementation in the logistics department
4. Did you receive the benefits you were looking for through this project?
5. Was the automation process faster than performing the tasks manually?
6. What were the biggest challenges during the project? How were they addressed?
7. Do you feel the collaboration between teams was effective?
8. What additional resources or support would have made the project easier?
9. What was the most significant improvement after implementing automation?
10. How would you rate the overall impact on process efficiency, with 1 being low efficiency and 5 being highly efficient?
11. Would you recommend using UiPath for other tasks?
12. Have there been notable changes in functional job satisfaction?
13. What lessons have you learned from this collaboration?
14. What suggestions would you make to improve future RPA projects?
15. What methods does your company use to document the logistics processes before handing them to RPA developers for automation?

Appendix 3: Interview Questionnaire for RPA Developers

1. Are you satisfied with the RPA outcome?
2. How do you ensure the reliability and accuracy of bots when automating processes that involve complex systems?
3. Were employees provided with any specific training or orientation related to UiPath prior to its implementation in the logistics department?
4. Do you think that functional area achieved all the benefits from this collaboration?
5. Was the automation process faster than performing the tasks manually?
6. What were the biggest challenges during the project? How were they addressed?
7. Do you feel the collaboration between teams was effective?
8. What additional resources or support would have made the project easier?
9. What was the most significant improvement after implementing automation?
10. How would you rate the overall impact on process efficiency, with 1 being low efficiency and 5 being highly efficient?
11. Would you recommend using UiPath for other tasks?
12. Have there been notable changes in functional job satisfaction?
13. What lessons have you learned from this collaboration?
14. What suggestions would you make to improve future RPA projects?
15. What methods does your company use to document the manual processes?