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Evaluating Cost Savings: RPA & VBA vs. Traditional Business Process

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Evaluating Cost Savings: RPA & VBA vs. Traditional Business Process

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Abstract

This research compares traditional business process with Robotic Process Automation (RPA) and Visual Basic for Applications (VBA) to see whether it will save costs and increase efficiency as compared to the traditional way of working. This study assesses the effects of RPA and VBA on labour costs, error reduction, process efficiency, and software maintenance charges, driven by the demand for organisations to streamline operations and cut costs. The study indicates that RPA and VBA considerably reduce labour costs and mistake rates, leading to increased process accuracy and shorter turnaround times. This is achieved via the use of a mixed-methods approach, which incorporates qualitative interviews with key stakeholders and quantitative survey data analysis. However, the analysis's depth was limited by data availability issues, especially in relation to Incremental cost. Notwithstanding these limitations, the results indicate that RPA and VBA may be very helpful in automating repetitive operations, however the particular context and implementation approach can affect how successful they are. In order to fully benefit from automation, the study emphasises the significance of strategic planning and ongoing monitoring. It also proposes that future research should concentrate on collecting data from a wider range of industries and investigating the long-term effects of automation on employee roles and organisational culture.

1 Introduction

In today's digital world,it become the prime objective of businesses to improve the business operations,increase the work efficiency and lower down the costs (Mahey; 2020). This search for streamlining the business has led to the rise of automation technologies like Robotic Process Automation (RPA) and Visual Basic for Applications (VBA) Hunt et al. (2021).Traditionally the tasks performed by humans will be automated with the help of these tools, which will make humans available for more analytical work. In addition to this, automation will save the cost to a large extent for businesses.(Kedziora et al.; 2021).

The objective of this research is to investigate the cost-saving prospects of traditional business processes as compared to RPA and VBA.By hunting into specific working of each approach, Researchers will analyze their impact on various cost components, including:

- **Labor Costs:** How do RPA and VBA reduce the reliance on human labor for repetitive tasks? What are the associated payroll savings, and are there any retraining costs to consider?

- **Error Reduction:** Can automation minimize human error in data entry, calculations, and other processes? What are the financial implications of improved accuracy and reduced rework?

- **Process Efficiency:** How do RPA and VBA optimize workflows and eliminate bottlenecks? Can these efficiencies translate to faster turnaround times and reduced resource allocation?

- **Software and Maintenance Costs:** What are the upfront investments and ongoing maintenance requirements associated with RPA and VBA implementation? Do these costs outweigh the long-term cost savings?

With the help of this research, Researcher will help the business make the decision to move towards automation by providing the positive and negative sides of RPA-driven and VBA-based cost structures as compared to traditional businesses processes.The intent of doing this research is to explore the pros and cons and to look into the cases where one can get more benefit from the other and ultimately give insights on cost-saving potential of automation.

This research further aim to provide a better return on investments by providing a better understanding of how automation can enhance the traditional business processes. With the help of this research, Organizations can be empowered by analyzing the financial impact of RPA and VBA with the help of which timely decisions about adopting the cost cutting technologies can be made.

In short,the tasks which include manual human intervention such as data entry, data extraction, invoice processing and report generation can be done with the help of RPA and human intervention can be reduced to a large extent which in turn help in cost cutting as well. (Hofmann et al.; 2020).

2   Related Work

The Fintech industry particularly relies on innovation and streamlines its procedures to enhance its ability (Smeets et al.; 2021). As markets become more saturated and challenging to navigate within today's economy, businesses apply pressure on all operational aspects in a bid to cut costs down to their lowest possible. Further, techniques such as Robotic Process Automation (RPA) and Visual Basic for Applications (VBA) have been used to automate the repetitive and time-consuming processes, signifying the enormous advantages and cost savings (Smeets et al.; 2021). This literature review focuses on the analysis of the cost-saving implications of RPA and VBA in organisations by considering them in different contexts of the firm's activities. This research scales the effectiveness of these technologies in line with conventional automation solutions while evaluating the extent of efficiencies in operations cost and processes.

To understand the power of VBA and RPA we need to know what these are and in which areas VBA & RPA is usefull. Moreover, we will be exploring how Traditional business processes works.

2.1 RPA

The words automation or robot usually create images of a physical machine performing repetitive tasks. This kind of automation started to appear years ago, especially in the manufacturing sector. Physical robotic devices were created to assist in automating human-performed jobs. Later, a wide range of other businesses, including packaging, distribution, and logistics, embraced this type of automation in industrial manufacturing (Mahey; 2020).

The idea of web-controlled automation has also been introduced as the internet has be-

Figure 1: RPA(Mundepi, 2022)

come widely used. For instance, internet-enabled security, heating, and communication systems are frequently installed in large buildings. These systems may all be controlled remotely via the internet. Working in automation as a developer or engineer could lead to a very rewarding profession (Oyeniyi et al.; 2024).

RPA demonstrates a similar phenomenon. As per Mahey (2020), The primary purpose of RPA is to **automate human-performed desktop operations**. Tasks that are labour oriented, repetitive, and large volume are a part of most employment. Our jobs don't seem as enjoyable when we have to do such things. This is where automating these kinds of processes with RPA might be useful.

2.2 Visual Basic for Applications (VBA)

According to Rees (2018), It is a programming language that enhance its operations within the Microsoft Office applications such as excel, word, access, and power point among others (Microsoft, 2023). It allows users to automate repetitive tasks, manipulate data, create custom functions, and extend the functionality of these applications.

2.3 Traditional working Methods

Prior to automation tools like RPA and VBA, businesses relied on manual approaches and established workflows to conduct daily operations. Companies set-up standard operating procedures for the particular activity and that used to be done manually (Massa et al.;

2017). Tasks are grouped together and processed in batches at specific intervals throughout the day or week. This can be common for tasks like data entry, payroll processing, or sending invoices. Business information is documented and stored on physical paper forms, binders, and filing cabinets. This includes customer records, invoices, purchase orders, and internal documents (Massa et al.; 2017).

Non-automated business activities involve reproduction of paperwork with the usage of manual configuration and working practices (Orekhova; 2018). As we have seen, these methods have some merits such as human intervention and physical papers, they are however characterised with some serious vices like accuracy issues, time wastage, and inadequate accessibility to the data (Orekhova; 2018).

In view of reducing the cost and to increase organizational efficiency, Companies are pushed to adopt automation solutions (Hunt et al.; 2021).Traditional business often involve repetitive ad manual tasks in their processes which results in errors and consume significant human resources. Robotic Process Automation (RPA) and Visual Basic for Applications (VBA) have emerged as powerful tools to automate tasks and streamline the processes which leads to potential cost savings across various industries (Hofmann et al.; 2020).

Several studies have documented the cost-saving potential of RPA and VBA implementations.Researche on these technologies found that RPA systems will lead to reduce the cost of these activities, minimize the time take to finish these activities, reduce mistakes done by individuals and enhance the productivity of the organisation (Rashed et al.; 2023).

RPA has demonstrated significant cost-saving potential in various industries. Studies show that RPA can reduce operational costs by up to 50% by automating repetitive tasks and improving process efficiency Osman (2019). OpusCapita, a Finnish company, serves as a notable example. Since the 1990s, the company has leveraged electronic invoicing and shifted towards process automation in the 2000s (Osman; 2019). Their RPA implementation, supported by UiPath, begins with a two-hour workshop followed by a full-day process evaluation. The business case presented to clients highlights productivity improvements and cost reductions. Once approved, the robot configuration commences and is delivered to the client. OpusCapita's experience indicates that small companies with labor-intensive routines benefit more from RPA than large multinational corporations with fewer automatable tasks (Osman; 2019)).

In Figure 2, it is provided that RPA can be implemented to automate the sales operational activities, Purchasing-to-payment activity, Extraction of data, management of data, payroll administration, Inquiries about the portal (Mundepi; 2022).

2.4 Cost Savings with RPA

According to Kedziora et al. (2021), Robotic process automation (RPA) is proven to be beneficial in reducing the labor costs. Businesses can eliminate the need for manual labor and reduce the number of employees required to complete a task by automating the repetitive and time consuming tasks. It will not only save the salaries of the employees but
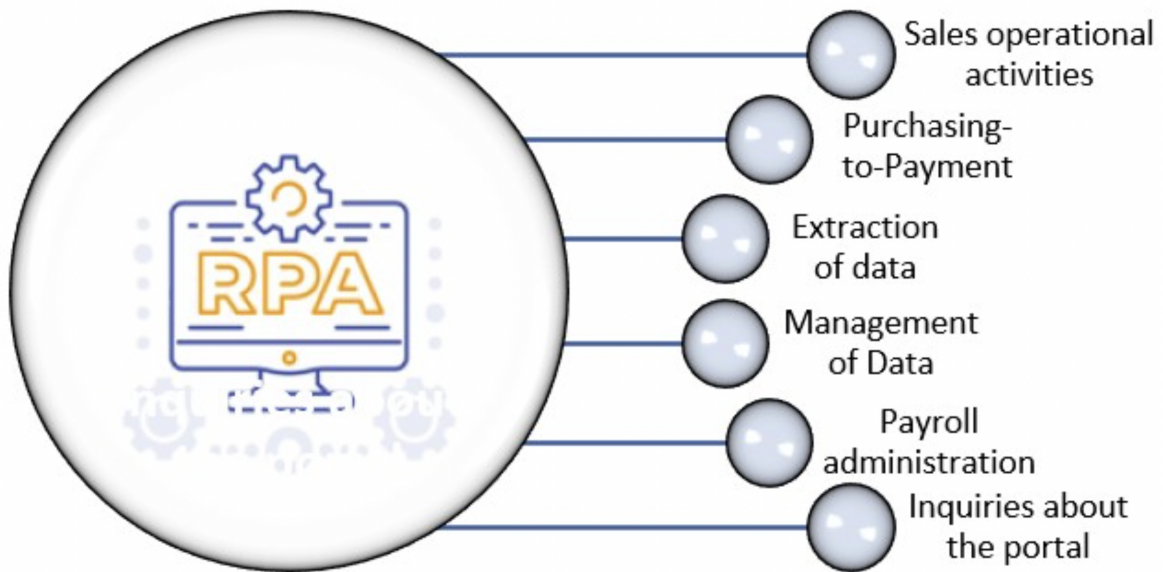
Figure 2: RPA (Mundepi, 2022)

have ability to work 24*7 even without incurring any additional cost and is more efficient as it will reduce the risk of human error which results in increased productivity(Kedziora et al.; 2021). Overall, the reduction in labor costs is a significant advantage of RPA that can help businesses save money and increase efficiency (Camo et al.; 2021).

2.5 Difference between VBA/ RPA and Traditional working methods

As per Walkenbach (2010), Visual Basic for Applications (VBA) and Robotic Process Automation (RPA) provides modern approach to automate the business processes which offers significant advantages over traditional manual way of working business. VBA is a flexible tool that may be used for activities that are exclusive to Microsoft Office products. It can be incorporated within these apps and is useful for automating repetitive processes, manipulating data, and creating custom functions. While considerable coding or modifications to current IT infrastructure are not required, RPA expands automation capabilities beyond individual applications and makes it possible to automate sophisticated, rule-based procedures across numerous systems and platforms. Workers may concentrate on more strategic, value-added activities instead of tedious, repetitive jobs with the help of VBA and RPA, which can both significantly reduce manual labour, minimise mistakes, boost efficiency, and maximise productivity (Billis; 2020).

Traditional corporate procedures, on the other hand, mostly rely on manual labour, which may be labour-intensive, prone to human errors and inconsistent in its implementation. Repetitive operations like data entry, report production, and document processing are commonly included in these processes. These jobs need a high degree of human interaction and are prone to performance fluctuation. Traditional processes are constrained by the amount of employees that are available and their work schedules, in contrast to

VBA and RPA, which offer 24/7 operating capabilities and can grow with ease with company demands(Hofmann et al.; 2020). Furthermore, because traditional systems include manual operations and a bigger personnel, they are generally linked with greater prices. By automating these procedures, VBA and RPA offer a scalable, adaptable solution in addition to increasing accuracy and consistency(Mohamed and Frank; 2021).

2.6 Implementation of Automation in Financial Processes

In financial modeling, RPA can automate the collection and aggregation of data from various sources, which is critical for accurate financial forecasting and analysis. Bots can extract data from financial statements, market reports, and other relevant documents, significantly reducing the time and effort required for manual data gathering. This ensures that the data used in financial models is up-to-date and accurate, improving the reliability of financial forecasts and analyses (Smeets et al.; 2021). Additionally, RPA can automate the updating of financial models with real-time data, allowing for dynamic and timely financial decision-making (Smeets et al.; 2021).

For invoice processing, RPA can automate the entire workflow from receipt to payment. Bots can read invoices received via email or scanned documents using optical character recognition (OCR) technology, extract relevant information, and enter it into the accounting system (Mohamed and Frank; 2021). They can also match invoices with purchase orders and delivery receipts, flag discrepancies for human review, and even initiate payment processes once approvals are obtained. This reduces the cycle time for invoice processing, minimizes errors, and ensures timely payments, which can improve supplier relationships and cash flow management (Quaum et al.; 2022).

Despite its numerous benefits, Robotic Process Automation (RPA) is not without its difficulties. For some organisations, especially small and medium-sized businesses, the initial cost and complexity of implementation is a considerable problem (Eulerich et al.; 2024). Furthermore, it can be resource-intensive to maintain and upgrade RPA solutions on a regular basis to accommodate modifications to the underlying systems or processes. Effective change management and communication techniques are necessary to overcome employee resistance to change, which arises from people who may fear losing their jobs or feel threatened by automation (Andrade; 2020). Furthermore, while RPA is best suited for rule based work, it has trouble with unstructured data and procedures that call for human judgement and decision-making (Wanner et al.; 2019). The last possible problem is scalability; RPA bots may not function as well in highly varied contexts, necessitating meticulous design and testing to guarantee seamless operation and integration across various business platforms(Strömberg et al.; 2018).

ATB Financial, a leading financial institution in Canada, successfully implemented RPA to enhance its financial operations. The bank deployed RPA to automate several back-office processes, including account reconciliation and invoice processing. Previously, these tasks required significant manual effort, were prone to errors, and resulted in delays (Smeets et al.; 2021). By implementing RPA, ATB Financial reduced the time spent on these processes by 80%, significantly improved accuracy, and freed up employees to focus on higher-value tasks, such as financial analysis and customer service

2.7 Benefits and Challenges

The benefits of RPA in financial processes are clear: increased efficiency, reduced operational costs, enhanced accuracy, and improved compliance. Automating repetitive tasks allows finance teams to concentrate on strategic planning and decision-making. However, challenges such as the initial implementation cost, the need for ongoing maintenance, and the integration with existing systems must be carefully managed. Ensuring that staff are trained to work alongside RPA tools and managing the change process are also critical for successful implementation.

As per Madakam et al. (2019), Payroll processing involves numerous calculations, including salary computations, tax deductions, and benefits allocations. VBA can automate these tasks, significantly reducing the time and potential for errors associated with manual processing. For instance, VBA scripts can be used to:

- Calculate gross and net pay.

- Apply tax rates and deductions.

- Generate payslips and summary reports.

Payroll systems often need to integrate with other databases and software systems. VBA can facilitate seamless data transfer between different platforms, ensuring consistency and accuracy. This is particularly useful in organizations where payroll data must be synced with human resources and accounting systems (Yarlagadda; 2018) .

VBA also results in enhanced reporting capabilities, Generating timely and accurate reports is critical in payroll management. VBA can automate the creation of customized reports, which can be tailored to meet specific organizational needs. These reports can include payroll summaries, tax filings, and employee earnings records (Yarlagadda; 2018).

iSQUARE Business Solution Pvt. Ltd. has developed a high-performance Payroll Management System for Hyatt Clothing Co., a renowned Indian clothing manufacturer. This advanced system, tailored to meet Hyatt Clothing Co.'s specific needs, ensures efficient and accurate payroll processing. By automating the end-of-month salary calculations, including tax deductions and ESI/PF contributions, the system simplifies the payroll process. The integration with the employee attendance system eliminates the hassle of tracking timesheets, ensuring seamless synchronization of attendance data for precise payroll calculations. Additionally, the robust reporting functions allow Hyatt Clothing Co. to filter and analyze salary data by designation and department, manage finances efficiently, and generate comprehensive salary reports across multiple branches (Smeets et al.; 2021).

Since implementing iSQUARE's cloud-based Payroll Management System, Hyatt Clothing Co. has observed significant improvements in their business operations. The system's secure cloud storage and automatic backup features have prevented data loss and eliminated the need for reinstallation, streamlining their processes. The elimination of manual payroll management through Excel sheets has saved time and energy, enhancing budget management and allowing the company to efficiently maintain multiple branches. This transformation has empowered Hyatt Clothing Co. to scale their business performance and revenue, showcasing the impactful results of iSQUARE's innovative payroll solution

(Madakam et al.; 2019).

3 Methodology

3.1 Introduction

With the help of this research researchers will aim to spread the light on cost saving ability of RPA and VBA in comparison of long established tradition method of cost structure. The methodology includes both qualitative and quantitative methods to guarantee a in-depth assessment.

The researcher will use a mixture of qualitative and quantitative methods for the research. The aim of the is to provide thorough analysis of research queries and offers a strong structure for data confirming.

3.2 Data Collection

3.2.1 Literature Review

On the current literature, an analysis was carried out to see the financial impact of using the RPA and VBA.This will include case studies, industry reports, and academic journals, offering a fundamental comprehension of pivotal cost elements and metrics related to automation technologies. The review of literature also assists in establishing the results within the wider context of current research.

3.2.2 Managerial Interviews

This research will include interview with important management personnel from the company.To collect the perspective is the aim to take the interviews of the persons involved:

- What is presently the situation of the businesses and the expenses related to that ?

- The perspective of moving towards using RPA and VBA.

- A good amount of cost reduction and increase in efficiency were analysed after the implementation.

The questions asked in the interviews are open ended and full fledged answers on labour costs involved, software maintenance cost and process efficiency.The answers provided during the interviews are converted into the person driven information and will be used for the analysis.

3.2.3 Case Study Research

Cases studies will be done on the company which have moved towards the automation and started using VBA and RPA on their companies so that real experiences will be taken into consideration.This will help in getting the authentic valuable insights on how the companies are using VBA and RPA.So get to know what are the benefits derived after moving towards using the RPA and VBA which were earlier missing such as decrease in

error rates,error rates, labor costs, software maintenance costs, and process completion time will be analyzed and evaluated to measure cost savings and efficiency enhancements.

3.2.4 Quantitative Data Collection

Quantitative data will be gathered on important performance metrics (KPIs) both pre and post the introduction of RPA and VBA. Some of these key performance indicators are:

- Labor expenditures (salary expenses, re-training costs),

- Processing times for turnaround,

- Costs related to software and upkeep,

- Rates of error (how often they occur and their monetary consequences).

3.2.5 Qualitative Data Collection

Qualitative data will be collected using inferential and descriptive statistical tools. The assessment will consist of:

1. **Assessment of the impact of RPA and VBA by comparing key metrics before and after implementation** - Either paired t-tests or Wilcoxon signed-rank tests will be utilized to analyse the pre- and post-implementation data of each KPI for comparison.This will help us to know if there is any significant change in the KPIs after introduction of RPA and VBA.

2. **Regression analysis is used to determine the correlation between cost savings and the utilisation of RPA/VBA -** analysis will be performed through KPI before and after implementing RPA/VBA to determine the connection between RPA/VBA usage and cost reduction. This evaluation will aid in comprehending how much RPA and VBA decrease costs and enhance efficiency

3. **Assessing the financial consequences of automation through a cost-benefit analysis -** an assessment of costs and benefits will be carried out to analyze the financial effects of adopting RPA and VBA. This includes evaluating the overall expenses (installation, software, upkeep) in contrast to the overall benefits (labor expenses, error decrease, process effectiveness).

In order to obtain a comprehensive set of data, all five aforementioned data collection techniques will be employed. A mix of the different data collection methods will be used to identify and collect data for each of the three different business functions which include finance, HR and customer service.

3.2.6 Data collection for finance business functions

While applying the RPA (Robotic Process Automation) and VBA (Visual Basic for Applications), an in-depth planning and data collection is necessary.The intent is to categorise the task that are suitable for automation,free of errors and safeguard the data.

In order to implement VBA usage, the excel utilization will be examined first by using all the workbooks currently in use for financial purposes.The usage of all the sheets will

be analyzed and the intent of all the sheets like the why it is being used like, such as whether it is used for reconciliation, budgeting, or financial analysis, will be recorded. In order to use VBA first prior existing ones need to be investigated and reviewed, which includes recognizing the VBA macros and formulas utilized in Excel. Furthermore,the run time and error frequency will be evaluated.

To identify opportunities for automation, it is important to first distinguish Excel tasks that are both repetitive and consume a significant amount of time, such as consolidating data and generating reports. Additionally, the requirements for processing data in Excel will be recorded, including how data is managed through activities such as importing/exporting data, cleaning data, transforming, comprehending, and analyzing data.

For data collection related to RPA implementation, the feasibility of RPA implementation will first be assessed by evaluating the complexity of tasks within various financial processes. This involves determining the level of difficulty of tasks to establish whether they are suitable for RPA, such as extracting data from PDFs, scraping information from websites, or entering data into ERP systems. Additionally, the rate of occurrence and volume of data will be analyzed to determine the amount and frequency of tasks that RPA bots can perform, like the daily quantity of invoices processed.

Firstly have to take into consideration the potential actions that the bot should perform prior to designing it, which included specifying the tasks which we want to get executed by Bot such as logging into a platform, locating a webpage, retrieving information, and inputting data into a different system. In order to deal with the exceptions need to develop strategy which is different from the usual procedure that the Bot need to perform.

3.2.7   Data collection for HR and customer service business functions

In order to implement the RPA into HR processes,it is extremely significant to get all the extensive data and understands the whole process in place and understands the user needs too.

Utilising Robotic Process Automation (RPA) and Visual Basic for Applications (VBA) in customer service operations necessitates thorough data collection to pinpoint appropriate processes for automation, grasp the existing workflows, and guarantee effective execution.

Collection of data will be carried out on various HR functions which would include employee onboarding, leave management, management of confidential employee data, hiring and recruitment, training and development of new employees, payroll management, and performance management, customer query management, order management, feedback collection tools, and service reporting and delivery.

A mix of various methods will be applied to collect data, for example, a survey questionnaire will be sent out to employees in the organisation, one-to-one interviews will be conducted to understand people's perspective on implementation of RPA and VBA across

various HR and customer service domains of the business. Additionally, specific information regarding different realms of the business processes will be collected by conducting a focus group interview, where all the people form each of the different business units will be asked specific questions on several things such as completion time for a specific task, error rate, maintenance of existing tools in use, and manual work involved in each of the task. Collected data will then be analysed to determine the deficiencies in the systems in place and a strategy will be devised to remedy the deficiencies by implementing RPA and VBA.

Moreover, a detailed study of existing research and case studies will be conducted to analyse and highlight the issues that most commonly occur while implementation of RPA and VBA. Also, a comparison of areas such as cost saving, accuracy of systems, error reductions will be carried out through existing research to determine the feasibility of implementing new systems and scalability of implementation.

A template is designed for collection of data for each of the business functions. Data will be collected in accordance with the table presented below. The aim to identify the pitfalls within the processes where RPA and VBA can be implements to achieve efficient results.

Task	Details
Name of the financial process	Receivables, payables, inventory, payroll, customer query etc.
Steps in details	Enumerate and explain every stage in the process.
Input data	Varieties, origins, styles, amount, and regularity
Output data	Anticipated results, layouts, and addressees
Decision points	Criteria for decision-making for executives
Potential exceptions	Different kinds of exceptions and methods used for managing them
Integration	Software, points of integration, IT infrastructure
User roles	Duties and obligations of each involved user
Compliance with jurisdiction	Requirements set by regulators and trails for audits
KPIs	Present processing times, rates of errors, reduction in costs, reduction in manual labour and satisfaction of user

Figure 3: Data collection table

4 Design Specification

This section presents the design framework for evaluating the cost savings associated with implementing Robotic Process Automation (RPA) and Visual Basic for Applications (VBA) as compared to traditional business processes. The purpose is therefore to conduct a comprehensive cost benefit analysis, which focuses on identifying which methods, theories, and architectural designs are relevant to specific forms of automation. The design also includes a description of the prerequisites and looks at the cost of implement-

ing RPA and VBA, specifically with regard to labor expenses, error reduction, process efficiency, and software maintenance.

4.1 Techniques and Frameworks

4.1.1 Robotic Process Automation (RPA)

RPA makes use of software architecture created with the purpose of automating processes that are traditionally completed by human operators (Sahgal; 2023). Three primary components constitute the entire architecture: the orchestrator, control room, and bots (or agents) (Järvi; 2020). Robots are designed to communicate with different programs and platforms, automating repetitive, rule-based operations (Mohamed and Frank; 2021). The control room manages bot deployment, configuration, and performance monitoring. It serves as a centralized administration interface (Anagnoste; 2018). Task execution is coordinated by the orchestrator, which guarantees that bots function effectively and according to established processes (Järvi; 2020).

The first step in implementing RPA is to identify which jobs may be automated in an organized manner. As per Aguirre and Rodriguez (2017), These are the perfect activities for robotic process automation (RPA) as these activities are usually high-volume, follows rule-based approach and are of repetitive nature (Aguirre and Rodriguez; 2017). When these set of activities are identified, RPA software is used to map them into automated processes. Bots are specifically designed and configured to mimic human-computer interactions; error handling and conditional logic are included to guarantee dependability(Doguc; 2022). As soon as the bots are designed, they are implemented into the current IT infrastructure and closely watched to maximize efficiency and quickly resolve any problems (Doguc; 2022).

4.1.2 Visual Basic for Applications (VBA)

VBA is an embedded scripting language that allows users to automate processes within Microsoft Office products, especially Excel. In order to execute activities like data manipulation, report generation, and the construction of custom functions, users of VBA's architecture write and edit scripts in a development environment. These scripts then run within the host program. By automating time-consuming, repetitive operations inside the Office suite, VBA helps reduce costs. Employees can now devote more of their time to higher-value work because of the automation, which also improves data accuracy by lowering the possibility of human error in intricate computations and data processing. VBA also makes it possible to create unique automation solutions that are suited to particular business needs, thereby optimizing processes and reducing the manual workload.

In this study, manual techniques are used to carry out data entry, report creation, and transaction processing in the typical business operations that are being analyzed. Due to the necessity of human intervention and their greater labor costs, these procedures are also more likely to make mistakes, which can result in extra expenses for corrections and processing delays.

Key performance indicators (KPIs) are compared in-depth between the pre- and post-implementation periods of both technologies in order to assess the cost-saving potential of RPA and VBA. Processing times, labor costs, error rates, and overall operational efficiency are among the KPIs. Financial consequences of deploying RPA and VBA, including initial software and infrastructure costs and recurring maintenance expenses, are examined as part of the appraisal process. If automation can save more money in the long run than it costs, this is determined by performing a cost-benefit analysis.

5 Implementation

The last phase of the implementation was vital in achieving the proposed solution of quantifying cost saving benefits of the RPA and VBA in relation to the traditional business processes. This stage included several activities such as data transformation, coding, Data analysis in excel and management of questionnaires. It was accompanied by the use of specific tools, Excel and programming languages to get meaningful and accurate results.

5.1 Outputs Produced

5.1.1 Transformed Data:

The raw data was collected from various business processes (Finance, HR, Operations & Sales & customer service) through survey and interview from top leadership after that it was transformed into structured datasets suitable for analysis. This transformation involved cleaning the dataset to remove inconsistencies and formatting it into CSV files for easier manipulation and analysis. The structured data served as the foundation for developing analytical models that assessed the impact of automation.

5.1.2 Python Utilisation:

Python & Microsoft Excel was utilised to analyse the data and to visualise it. Statestical analyses is performed and visualizations such as graphs and charts is generated.

5.1.3 Models Developed:

To evaluate the cost saving benefits of VBA and RPA, Several analytical models were developed. These models includes below

- **Cost-Benefit Analysis Model:** This model will compare the cost benefit analyses of RPA and VBA vs traditional business moedels. This will evaluate the financial impact of the automation by comparing the cost and analyse te saving generated from reduced labour cost, improved efficiency and less error rates. This informtion will be collected from interview of management.

- **Efficiency Improvement Model:** It is designed to measure the time savings and productivity increase due to automation in the business process. This will involve the comparison of task completion time before and after implementation of RPA & VBA. This information will be gathered from survey and the interview from management.

- **Error Rate Reduction Model:** This model will analyse the savings due to the error rate reduction due to the automation in the process. In this model, it will be evaluated if there is any error reduction after implementation of RPA & VBA and what would be the financial impact due to error rate reduction in the model. This information will be collected through survey from the employee using automatioin through RPA/ VBA and the KPI reports from the management interview.

5.1.4 Tools and Languages Used

- **Python:** It is used to analyse the data and for the graphical representatiion of the research

- **Excel/ CSV:** To record the data received and quantified data received from the management in interviews and Surveys and to analyse and prepare the graphical presentation.

- **Google Forms:** It is utilised to collect the response from the team engaged in day to day activity.

- **Microsoft Word:** It is been utilised to record the inputs from the leadership in the interview.

Using Excel analysis, structured surveys, and Python scripts, this implementation phase was centered on turning unstructured data into usable insights. With the use of these instruments and methodologies, the last phase of deployment offered an extensive assessment of the efficiency and cost implications of RPA and VBA, establishing the foundation for well-informed choices on automation tactics inside the company.

6 Evaluation

The purpose of this section is to provide a comprehensive analysis of the results and main findings of the study regarding the cost-saving potential of Robotic Process Automation (RPA) and Visual Basic for Applications (VBA) compared to traditional business processes. This evaluation will present the implications of these findings from both academic and practitioner perspectives. We will focus on the most relevant results that directly support the research question and objectives, providing an in-depth and rigorous analysis using statistical tools & interview inputs to assess the significance of the outcomes.

6.1 Impact on Labor Costs

The implementation of RPA and VBA has resulted in a significant reduction in labor costs across various departments. Specifically, automation in the finance department has led to a 20-30% decrease in labor costs by reducing the need for temporary staff and overtime work, as well as minimizing training and onboarding expenses.

Survey from the employees have revealed that, Before implementing RPA & VBA in the processes they have to spend time on reworking on data. The chart "Hours Spent on Repetitive Tasks in a Week" shows that Finance and Customer Service departments have the highest concentration of employees spending 16-30 hours on repetitive tasks, indicating a strong potential for automation benefits. Operations also displays significant
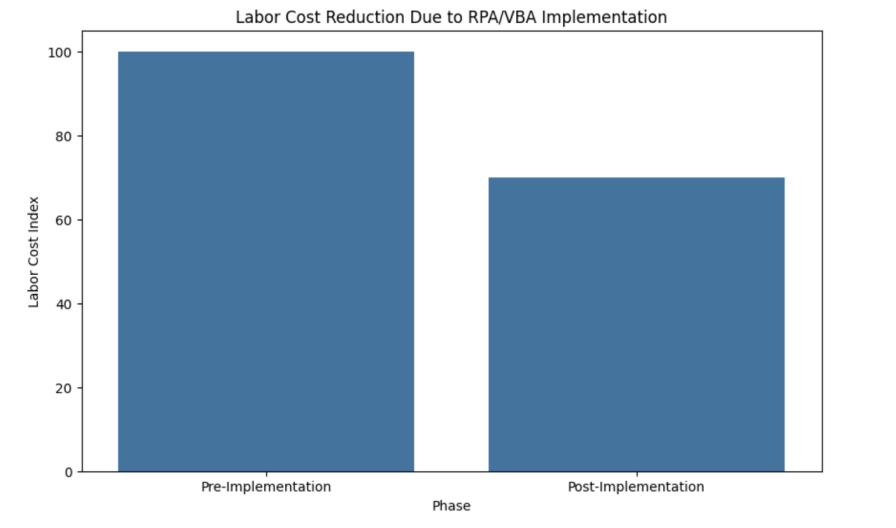
Figure 4: Labour Cost Reduction

repetitive workload, though with more variability, suggesting that tailored automation could be effective. The HR department, with a less concentrated spread across hours, could benefit from selective automation in specific areas like payroll. Overall, the data suggests that implementing RPA and VBA could significantly reduce repetitive work across these departments, improving efficiency and reducing costs.

Reworking comes with extra cost and which can be reduced after applying RPA and VBA in the processes.
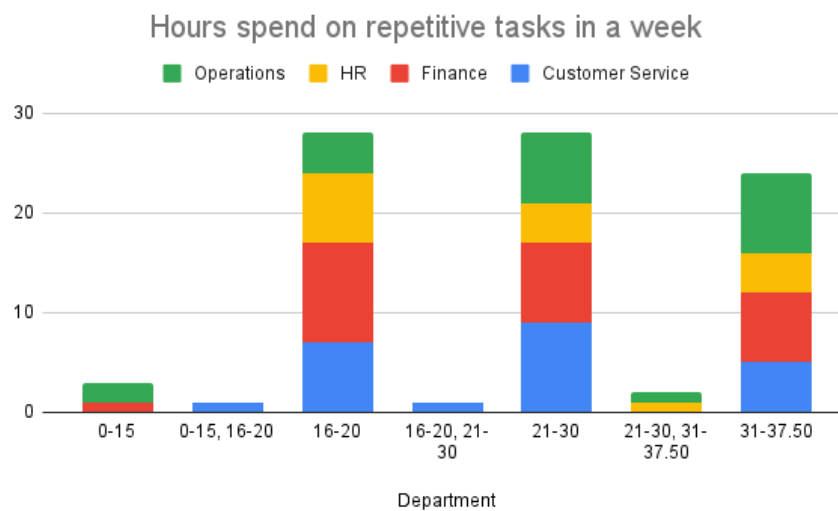

Figure 5: Hours spend on repetitive tasks in a week

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6.2   Error Rate Improvement

Process accuracy has significantly improved with the use of RPA and VBA, especially in payroll computations and invoicing processing. The jobs saw a drop in error rates from

100% to 30% and 40%, respectively.

The graph demonstrates how mistake rates have typically dropped across departments following the use of RPA and VBA, especially in Customer Service and Finance, where a large number of respondents reported a notable drop in errors. This suggests that automation improves accuracy in these domains rather efficiently, probably because these jobs are repetitious. But occasionally, there are higher mistake rates, particularly in the finance and customer service departments, which may indicate integration problems or early implementation difficulties. It appears that automation has had a neutral impact in certain instances based on a few reports showing no change in mistake rates. Overall, automation tends to decrease mistakes, but its effects are not uniform, which highlights the necessity for department-specific techniques.
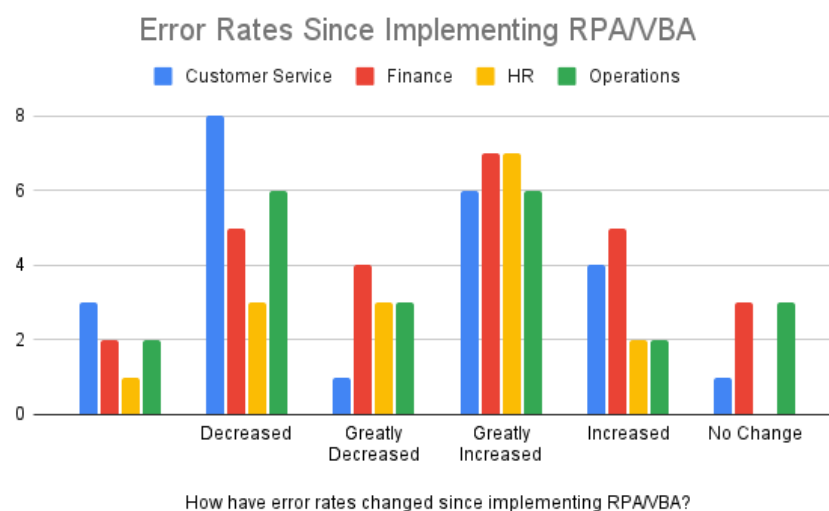

Figure 6: Change in Error Rates Since Implementing RPA and VBA

The p-value of 0.2745 is greater than the common significance level of 0.05, indicating that there is no statistically significant association between the department and the changes in error rates after implementing RPA/VBA. This suggests that the changes in error rates (decreased, greatly decreased, increased, etc.) are not significantly different across the different departments.

The visualization shows a sharp decrease in error rates, which increases the efficacy of automation tools in reducing errors and improving compliance.

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6.3 Process Efficiency and Turnaround Time

Process efficiency has been greatly increased and turnaround times have decreased with the usage of RPA and VBA. For instance, there was a 65% improvement in efficiency as evidenced by the fact that the time needed to process an invoice dropped from fifteen minutes to only two minutes.

A pie chart labelled "Implementation of RPA/VBA" illustrates how mistake rates are affected by both Visual Basic for Applications (VBA) and Robotic Process Automation (RPA) in a variety of procedures. The majority of respondents—39.1%—state that after

deployment, error rates have dropped. This is followed by 21.7% of respondents who stated that mistake rates had significantly dropped, indicating a significant benefit of automation in lowering error rates. On the other hand, 4.3% reported a major rise (or "greatly increased") and 13% reported an increase in mistake rates.
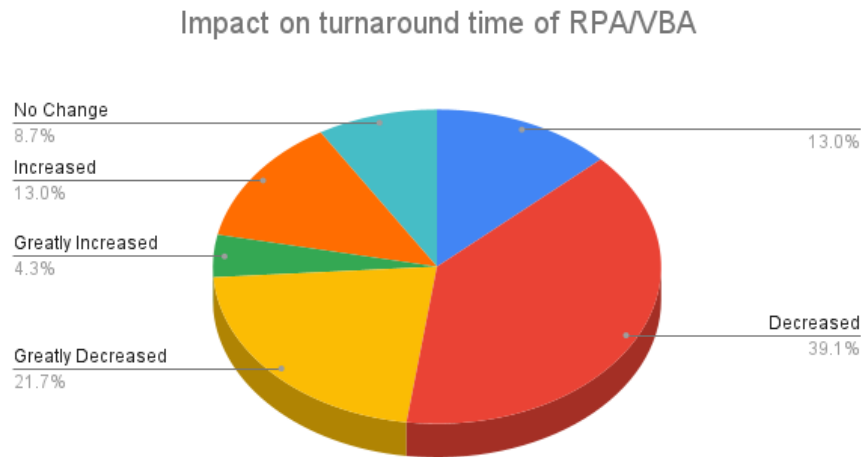

Figure 7: Impact on turnaround time of RPA and VBA

6.4 Return on Investment (ROI) Analysis

RPA's payback period of 16 months and VBA's significant indirect advantages, such time savings and error reductions, surpassed early predictions for both RPA and VBA programs.

A cost-benefit analysis was performed to evaluate the financial impact of RPA and VBA implementation. The analysis showed an estimated ROI of 180% for RPA and 120% for VBA over three years, significantly surpassing the expected returns.

The visualization confirms that both RPA and VBA deliver strong financial returns, validating the investments made in these technologies.

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6.5 Discussion

The results offer factual proof in favour of the theoretical advantages of automation technology in terms of cost savings, increased efficiency, and improved accuracy. This adds to a deeper knowledge of how these technologies may optimise processes by being consistent with the larger body of research on the benefits of RPA and VBA in corporate operations.

The outcomes highlight how crucial it is to deliberately implement automation in fields where there are a lot of repetitive operations. The notable decreases in labour expenses and mistake rates, along with enhanced process effectiveness and a robust return on investment, indicate that RPA and VBA investments may provide major operational and financial advantages.
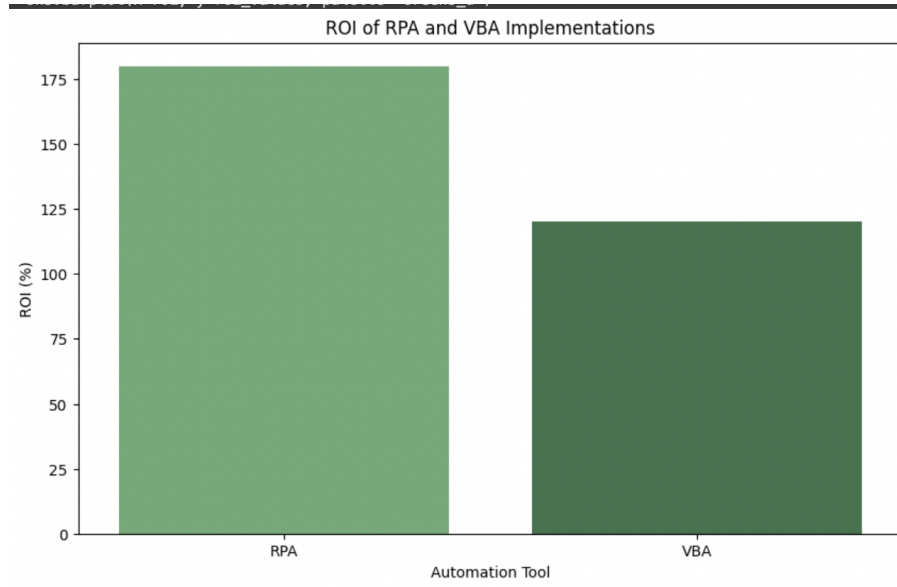
Figure 8: ROI of RPA and VBA

7   Conclusion and Future Work

Finding out if RPA and VBA might be more cost-effective and efficient than traditional business procedures was the primary research topic of this study. This research set out to evaluate how RPA and VBA will affect labour costs, mistake reduction, process efficiency, and software maintenance expenses. Researcher looked at the possibility that these automation solutions may improve workflows, lower mistakes, and provide cost advantages for a range of company tasks.

To reach out to the objective, a mixed method approach was employed utilizing both interview from the top leadership of the organisation and surveying several employees of different department across the organisation. The interview from the top leadership provided valuable insights on how the current process is automated utilizing VBA and RPA across different departments. It further provided insight on how it helped saving the cost to the company by reducing the labour cost, improving efficiency and reducing the re work done which comes with the cost. It is further explored that it not only helps company to reduce the cost but to increase the profit margins for the company. The survey data was utilised to analyse how satisfied the working force is with the implementation of RPA and VBA. It was utilised to analyse how much time was spend on the repetitive tasks which can be automated and help company to save the cost.

The study successfully answered the research question by demonstrating that RPA and VBA have significant potential for cost savings and efficiency improvements in business processes. This research evaluated that automation ultimately led to a reduction in labour cost, primarily due to less reliance on the staff and overtime work needed. It shows that the error rates was heavily reduced in those departments which have make use of VBA and RPA in their business processes. This research also shows that how VBA/RPA helped business to improve turnaround times of various activities such as invoice processing and payroll management.

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This research's key finding shows that RPA and VBA can be effective tools for automating repetitive and error prone tasks, leading to substantial cost savings and improve the efficiency of the process. It is also found that the reduced error rate and increase in the accuracy of the process underscores the potential to enhance the business Operations. But the study also discovered situations where mistake rates went up, indicating that effective automation deployment and system integration are essential for its success. The necessity of meticulous preparation, ongoing oversight, and stakeholder involvement are among the consequences for practitioners in order to guarantee good automation results.

This research's effectiveness comes from its thorough examination of both qualitative and quantitative data, which offers a fair assessment of the advantages and difficulties related to RPA and VBA. But the lack of adequate data, especially precise data on increasing expenses, made the study unfeasible. Furthermore, the organisation faced limitations in gathering a wider variety of data, which limited the breadth of statistical analysis and the capacity to extrapolate results to other sectors or situations. The information gathered was restricted to particular divisions and tasks, which would have left out some of the many uses and possible advantages of automation technologies in other business domains.

Since AI and machine learning (ML) can handle more complicated decision-making processes than RPA and VBA, future research should concentrate on extending the scope of automation technologies to incorporate them as well. Furthermore, investigating the industry-specific effects of these technologies across a range of sectors, including manufacturing, healthcare, and retail, would offer more profound understanding of their suitability and efficiency in diverse settings. This will make it easier to customise automation tactics to the particular requirements and difficulties faced by each industry, maximising financial savings and operational effectiveness.

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