Nurmuhammad Davlatov

Robotic Process Automation

Optimization of Business Processes with a Cost-effective Automation Tool

Metropolia University of Applied Sciences

Bachelor of Administration

International Business and Logistics

Thesis

November 2023

Abstract

Author(s):	Nurmuhammad Davlatov
Title:	Robotic Process Automation: Optimization of Business Processes with Cost-effective Automation Tool
Number of Pages:	73 pages
Date:	29 November 2023
Degree:	Bachelor of Business Administration
Degree Program:	International Business
Instructor:	Heikki Heponiemi, Senior Lecturer

In response to the contemporary challenge of employee dissatisfaction arising from repetitive and mundane tasks, this study explores the potential of Robotic Process Automation (RPA) to optimize individual tasks within organizational processes. Recognizing the obstacles of high costs, lengthy implementation timeframes and the complexity associated with deployment of traditional automation technologies, this study focuses on the feasibility of small-scale, single-process automation through RPA. The study involves a literature review and interviews with employees from different business sectors to gain insights, subsequently proceeding to simulated implementation of RPA.

Findings reveal employee interest in RPA technology, though a common misconception persists that automation necessitates extensive planning by management. To challenge the misconception, two processes from different companies are identified and simulated for automation, showcasing the potential for employees to initiate small-scale automation.

In conclusion, this study illustrates how RPA effectively enhances small-scale organizational processes through task automaton. By utilizing common tools (Office 365) and encouraging individual employees to delve into RPA, organizations can achieve increased efficiency, higher employee satisfaction, and cost-effectiveness. This study contributed insights for businesses seeking practical approaches to enhance organizational processes through RPA implementation.

Keywords: Robotic Process Automation, RPA, automation, processes, implementation, rule-based, repetitive

Contents

Glossary

List of Figures 1

List of Tables 2

1 Introduction 3

1.1 Thesis Background and Research Objectives 4

1.2 Research Methods 6

1.3 Thesis structure 7

2 Impact of System Limitations on Knowledge Workers. 8

3 RPA vs Traditional Automation and Outsourcing Concepts 9

3.1 Business Process Management 10

3.2 Business Process Automation 12

3.3 Business Process Outsourcing 13

4 Robotic Process Automation 14

4.1 RPA. The Definition and Misconceptions 14

4.2 Process Selection Tools and Concepts 16

4.3 RPA Return on Investment 18

4.4 Understanding RPA Limitation and Challenges 19

4.5 Microsoft Power Automate 21

5 Process Development 29

5.1 Standard mapping out and implementation of RPA 29

5.2 RPA Implementation for a Citizen Developer 33

6 Empirical findings and implementations 35

6.1 Interviews 35

6.2 Interview with Company M 37

6.3 Interview with Company T 39

7 Implementation and Discussions 39

7.1 Company W Process Automation 40
7.2 Company M Process Automation 50
8 Summary and evaluation of solutions 56
8.1 Company W 57
8.2 Company M 59
9 Conclusion 61
10 Limitations 63
11 Self-reflection 64
References 65

Glossary

RPA	Robotic Process Automation
ERP	Enterprise Resource Planning
BPA	Business Process Automation
BPM	Business Process Management
BPO	Business Process Outsourcing
API	Application Programming Interface
CoE	Center of Excellence
DT	Deutsche Telekom
DTTS	Deutsche Telekom Technical Services
PA	Power Automate

List of Figures

Figure 1. RPA development vs Traditional IT & BPM development (Fersht and Slaby, 2012)..... 10
Figure 2. RPA positioning in compared to traditional transformation approaches (Deloitte, 2016)..... 12
Figure 3. RPA positioning (van der Aalst, Bichler and Heinzl, 2018)..... 17
Figure 4. Power Automate connector library (Mercurio and Merrill, 2021)..... 22
Figure 5. Visual depiction of an automated workflow (Pearson et al., 2020) .. 23
Figure 7. Decision-making flow chart in Power Automate (Yoshida and Osborne, 2022b) 25
Figure 6. Attended and unattended scenarios (Yoshida and Osborne, 2022a) 26
Figure 8. Framework for RPA implementation projects (Herm et al., 2022).... 30
Figure 9. Process creation steps for a citizen developer..... 34
Figure 10. Depicted process flow of Company W 40
Figure 11. Email trigger set via Outlook 41
Figure 12. ”Create file” action set via OneDrive included in ”Apply to each” control 42
Figure 13. ”List files in folder” action moves into condition which is inside ”Apply to each” control 43
Figure 14. ”Run script” action set via Excel Business connector..... 44
Figure 15. Trigger set via SharePoint 45
Figure 16. Excel ”Get Tables” action and ”Compose” data operation 45
Figure 17. ”List rows present in a table action” created via Excel Business Online..... 46
Figure 18. “Add a row into a table” action created via Excel Business Online, included into “Apply to each” control 47
Figure 19. Depiction of process flow of Company M 50
Figure 20. Application Form created via MS Forms..... 51
Figure 21: Trigger and ”get response details” action 52

Figure 22. ”Compose” data operation used to link strings together via ”concat” expression 52
Figure 23. SharePoint ”Create new folder” action..... 53
Figure 24. ”Compose” data operation used for creation of dynamic link to item 53
Figure 25. SharePoint ”create item” action 54
Figure 26. ”Send an HTTP request to SharePoint” action 55
Figure 27. ”Compose” data operation renamed to ”UploadLink” and ”Send an email” action used via Outlook..... 56
Figure 28. Overview of a complete flow for file formatting..... 57
Figure 29. Overview of a complete flow for importing new data to database 58
Figure 30. Overview of a complete flow of data manipulation for Company M process..... 61

List of Tables

Table 1. The comparison of BPM and RPA (Santos, Pereira and Vasconcelos, 2020) 11
Table 2. RPA challenges in detail from different organizational perspectives (Choi, R’bigui and Cho, 2021)..... 20
Table 3. Power Automate Pricing (MS Power Automate, 2021) 28

1 Introduction

In the modern business world, organizations strive for continuous improvement to maintain competitiveness and relevance. This drive leads them to explore new methods of enhancing processes and empowering their employees. A key objective in this pursuit is achieving efficiency by establishing effective and streamlined processes while minimizing waste. To unlock their full potential, companies employ various lean techniques and integrate software solutions such as Business Process Management (BPM) and Enterprise Resource Planning (ERP). These software programs offer significant advantages and have gained widespread recognition in the corporate sector. However, not all organizations can easily adopt BPM and ERP due to factors such as high costs, lengthy implementation timelines, or incompatibility with existing systems. As a result, many small and medium-sized businesses continue to rely on their legacy systems, often unaware of the cost-effective alternatives available to improve their organizational performance. In today's digitized world, it is crucial for businesses to leverage effective software solutions within their operations to harness the benefits of cutting-edge technologies and optimize their processes. By embracing these solutions, organizations can enhance efficiency, streamline operations, and stay competitive in an increasingly dynamic marketplace.

In the context of corporate efficiency and the implementation of digital technology, it is crucial to consider the inclusion of employees, who constitute a vital component of any organization. It is common that many corporate workers engage in extensive digital "labour work" during their working hours. Regrettably, such monotonous and repetitive work has become a substantial aspect of company operations, limiting the ability of corporate workers to utilize their creativity and make contributions towards more strategic objectives. This phenomenon is further elaborated upon in the second chapter of this study.

Robotic Process Automation (RPA) is a technology with the potential to address these efficiency gaps within companies and relieve employees from rule-based tasks. Furthermore, RPA is particularly suitable for businesses that still rely on legacy systems for various reasons. Although RPA is considered a relatively new technology, it has gained significant attention over the past decade. What sets RPA apart from other similar technologies is that it does not necessitate modifications to existing IT infrastructure, making it an agile and cost-effective solution. It is designed to work alongside existing systems, enabling companies to automate their processes without disrupting ongoing operations (van der Aalst, Bichler & Heinzl 2018: 1). Additionally, the automation of some of these tasks is relatively straightforward and involves techniques such as scripting and recording, rather than traditional software development. As a result, these implementations typically do not require IT personnel and can be automated by the employees themselves, resulting in minimal costs and quick implementation times (Jimenez Ramirez, 2021 cited by Herm *et al.* 2022: 4).

The concept behind RPA is to liberate employees from tasks that involve repetitive actions such as clicking, copying, pasting and manipulating the data. By automating these mundane activities, employees can reclaim their time, which can be directed towards more valuable tasks that necessitate human expertise or simply take a break from constant inflow of information.

1.1 Thesis Background and Research Objectives

Research on Robotic Process Automation was motivated by my personal interest as well as my previous experience implementing RPA. A particular catalyst for my interest in robotic process automation was a collaboration project with a German company. The objective of this project was to improve the sustainability documentation of the company's supply chain processes. Despite the availability of various software and tools in the market, the company preferred not to allocate a substantial budget towards their acquisition. Consequently, through research it was discovered that RPA was an ideal solution for the identified bottleneck, and, as a result, was included in the final proposal for efficient sustainability reporting of the company.

As a consequence of the project, I recognized the how much potential RPA could deliver for both companies and employees. Specifically, I observed that many office workers are unaware that repetitive and mundane tasks, which consume valuable time on a daily basis, can be outsourced to bots. This type of outsourcing can be achieved at a relatively low cost and results in enhanced efficiency and improved productivity for the company.

Additionally, during the investigation of academic research on the implementation of RPA case studies in companies, findings and suggestions have indicated that high costs are a prevalent issue during the implementations (Choi, R'bigui & Cho 2021: 301). Moreover, the automation of entire processes has proven to be challenging, as the findings suggest that small-scale, incremental implementation of RPA is more likely to lead to successful adoption of the technology, accompanied by a high learning curve and long-term success. To address these challenges, it is recommended to focus on the incremental automation of processes and conduct a thorough cost analysis as part of the development process (Järvinen 2021; Eskelinen 2019).

Based on my prior experience with RPA and a brief exploration of RPA vendors, I discovered that Microsoft Power Automate announced that their automation platform is free for use starting from 2021. This builds a connection with the problem that I intend to tackle in this study, at the same time it presents an opportunity for businesses and employees to benefit from automation technology without the burden of high budgetary investments.

The objective of this study is, therefore, to discover whether it is possible to optimize company processes through cost-efficient automation. The scope of automation is intended for a small-scale, single process which will potentially serve as a viable solution or as a ground for further automation within organizations.

Therefore, based on the trajectory of this study, the research questions are formulated as follows:

”Is Robotic Process Automation effective in optimizing organizational processes ?”

“Is it feasible to automate organizational processes at a low cost ?”

To ensure the credibility of the study, an evaluation of the existing literature on the capabilities of RPA and its common implementation practices is conducted. Empirical data is collected through interviews with employees representing various business sectors. The interviews aim to determine the demand for automating specific day-to-day processes. Once the processes are identified, they are mapped out, and attempts are made to automate them in a simulated environment. The main objective, as previously stated, is to assess the feasibility of automating and optimizing rule-based tasks with minimal investment and to evaluate the value that these task manipulations generate.

1.2 Research Methods

This study adheres to the research methods outlined by Kothari (2004: 3) for conducting applied research, with the goal of finding practical solutions to societal or business problems. The focus is on generating empirical data through interviews with employees from various sectors to identify opportunities for automating everyday processes. The study combines qualitative research methods and data collection through interviews, to establish empirically based simulated data, which is then used in implementation of pilot automations.

The theoretical part of the study involves conducting literature research from books, research articles and journals to understand the current state of Robotic Process Automation, including its capabilities, implementation requirements, and costs. Further, interviews are conducted with employees to gather first- hand insights into their tasks and processes. The collected data is then organized and structured for automation purposes

The Power Automate platform is utilized to automate the identified processes based on the gathered information. The results of the implementations are discussed with thesis supervisor and presented to the respective companies whose processes were considered for automation. The findings and outcomes of the study are documented in the findings and conclusion chapters, providing detailed descriptions and analysis of the results.

1.3 Thesis structure

The study begins by introducing the subject, then providing background information and stating the objectives, research direction, and methods employed in the thesis. It also outlines the structure of the thesis.

Section 2 focuses on evaluating the limitations faced by modern workers in their work environments. This section aims to highlight the current problems faced by workers and sets the stage for the simulations, which seek to enable workers to optimize their work processes.

Section 3 delves into the distinctions between Robotic Process Automation and traditional automation concepts, providing a comprehensive understanding of automation technologies for the reader.

Section 4 introduces RPA by defining the concept and addressing common misconceptions. It discusses the selection process for RPA, showcases return on investment (ROI) examples from companies that have implemented RPA at a large scale, and explores the limitations and challenges associated with RPA. This chapter also introduces Microsoft Power Automate as the platform to be utilized in the automation simulations conducted in the study.

Section 5 focuses on the detailed process development of RPA. It is divided into two parts: the first part covers the standard planning and implementation of RPA, while the second part explores RPA implementation for citizen developer.

Section 6 presents the empirical findings obtained from interviews, discussing the topics covered during the interviews and identifying the processes suitable for automation.

Section 7 provides a thorough report of the implementation steps taken during the task automation process. Sections 8 and 9, on the other hand, serve the purpose of summarizing the findings and concluding the thesis, respectively.

2 Impact of System Limitations on Knowledge Workers.

As Drucker (1992) coined the term “knowledge worker”, he visualized that in the 21st century the employees will be primarily involved in the creation, manipulation and distribution of knowledge as opposed to traditional manual laborers. According to Drucker knowledge workers use their intellect and skills to create value through their work, rather than just engaging in physical labor. They rely on their ability to think critically, analyze information, and make decisions based on data, rather than just following instructions. Despite the fact that digital technologies today are far more advance then in twentieth century where individuals had to get the work done manually, it is obvious that majority of employees still spend their worktime in organizations mainly by doing manual and common operations (Lacity & Willcocks 2015: 3).

One consequence of technological advancements is that workers now are required to spend a significant amount of time dealing with the unique characteristics and limitations of different systems. These characteristics are just as common as the strengths of the systems. For instance, automated operations systems (such as Enterprise Resourcing Planning, Customer Relationship Management, e-commerce, e-business solution systems) are inherently flawed in that they cannot complete an entire process from start to finish. To make technology worthwhile, knowledge workers must perform tedious tasks such as transferring large amounts of data from one system to another (Lacity & Willcocks 2015: 3).

Lacity & Willcocks (2015) observe that it is unfortunate to see how little time employees in larger organizations spend on value-creating and creative tasks, as they are overwhelmed with the numerous supportive tasks, they need to complete daily. Moreover, it is widely acknowledged that employees in the corporate sector desire to be relieved from monotonous tasks and in more stimulating work.

Companies do recognize the situation and acknowledge their employees' preferences. However, despite having plans to automate their processes, many projects fail to materialize. This can be attributed to strategic planning of RPA implementation, which often requires significant investments and long implementation timeframes, leading organizations to postpone the projects for a more opportune time (Choi, R'bigui & Cho 2021: 301).

3 RPA vs Traditional Automation and Outsourcing Concepts

In the realm of automation, there are various terms and concepts that can be overwhelming for those unfamiliar with them. It is common to come across terms like Business Process Automation (BPA), Business Process Management (BPM), Business Process Outsourcing (BPO) and Robotic Process Automation and feel confused about their meaning and how they differ from each other. Therefore, in this chapter, the author aims to provide clear and concise explanations of each of these terms and concepts, for a better understanding and differentiation. Moreover, this chapter will also serve as a comparison, highlighting the differences in development and usage between traditional automation technologies and concepts in contrast to RPA, as depicted in Figure 1.

Issue	Robotic Automation	IT Development via SOA and BPM
Development skills required to address new business unit requirements	Modest; can be done by process modelers and analysts with a few months of training with robotic automation tools	Extensive; requires software architects and engineers with years of experience with relevant programming languages, BPM tools, and enterprise application suites
Development methodology	Lightweight; takes advantage of the presentation layer of existing applications and their underlying logic and security	Heavyweight; requires complex application-layer integration or potentially brittle data-layer integration
Component re-use	High; functions can be reused to develop new robots	High, though comparatively expensive to develop

Figure 1. RPA development vs Traditional IT & BPM development (Fersht & Slaby 2012)

Figure 1 illustrates the varying degrees of development skills required and the levels of complexity associated with using both RPA and Traditional IT. As depicted in the figure, RPA demands minimal development knowledge and acquiring proficiency in this software typically takes only a few months. In contrast, IT development needs years of experience to effectively utilize programming languages and application suites.

3.1 Business Process Management

Dumas, M., La Rosa, M., Mendling, J. and Reijers H.A. (2018: 7-8) describe BPM as a comprehensive body of tools, techniques, methods, and entire methodologies that support all stages of the business process lifecycle. Business Process Management involves the identification, modelling, analysis, design, implementation, monitoring, and continuous improvement of business processes. The core function of BPM is managing, documenting as well as optimizing complex business processes (Dumas *et al.* 2018: 7-8).

Business Process Management software (BPMS) is used to manage, document, and automate business processes within the entire organization, which involve complex steps and different systems. Because of its complex nature, BPM is usually deployed in mid and large organizations.

Table 1. The comparison of BPM and RPA (Santos, Pereira & Vasconcelos 2020)

Domain	BPM	RPA
Business goal	Process reengineering (Forrester, 2014; Lacity et al., 2016)	Automation of existing processes (Lacity et al., 2016)
Application	Creation of a new application (Forrester, 2014; Khramov, 2018; Lacity et al., 2016; Lacity and Willcocks, 2015)	Use of existing applications (Aguirre and Rodriguez, 2017; Lacity et al., 2016)
Integration Method	Interacts with business logic and data access layers (Khramov, 2018; Lacity et al., 2016; Lacity and Willcocks, 2015)	Interacts with systems through the presentation layer (Aguirre and Rodriguez, 2017; Lacity et al., 2016; Lacity and Willcocks, 2015)
Process Suitability	Best suited for processes requiring IT expertise on high-valued IT investments (Suri et al., 2017)	Suitable for processes that require business and process expertise (Lacity et al., 2016; Suri et al., 2017)
Programming Requirements	Requires programming skills (Cewe et al., 2017; Khramov, 2018; Lacity and Willcocks, 2015)	Does not require programming skills (Aguirre and Rodriguez, 2017; Khramov, 2018; Lacity et al., 2016)
Development Responsibility	Development by programmers (Lacity et al., 2016; Suri et al., 2017)	Development by the business unit (Lacity et al., 2016)
Development Times	Long development times (Mindfields, 2015)	Fast development times – no complex integration required (Mindfields, 2015)

The confusion between BPM and RPA arises because each software seems to share the same objective, namely automating and optimizing business processes, however, the difference lies in their approach of doing it. To automate a process, BPM uses programming or APIs to access the system and the business logic layer of the company (Hofmann, Samp & Urbach 2020: 102). Consequently, BPM is considered a Heavyweight IT solution, referring to its complexity and requirement of high-level IT expertise and technical resources. (Bygstad 2017: 182). RPA, on the other hand, operates only in presentational layer, without need for significant changes to the underlying systems, therefore it commonly refers to Lightweight IT (Herm, Jaenisch, Helm, Imgrund, Hofmann & Winkelmann 2022: 4). Other attributes that make RPA Lightweight is its low-code nature, ease of operation and automation of individual tasks as opposed to complete business process cycles, as depicted in Table 1.

Taulli (2020: 16-20) sums up the definition of BPM coherently as a software or a combination of tools that involves various complex processes rather than individual tasks. Additionally, it demands greater investment of time, resources, documentation and training for its implementation, which makes it more suitable for bigger organizations and heavily regulated industries.

3.2 Business Process Automation

BPA refers to the technology that connects process design to application integration services. Its purpose is to automate the implementation of business processes and enable the execution of workflows that involve multiple heterogeneous applications (Melchert, Winter & Klesse 2004: 4054). The technology is used to streamline and optimize end-to-end business operations that involve different complex steps which go through various systems and applications. Therefore, BPA refers to the automation of entire business processes, including both manual and digital tasks.

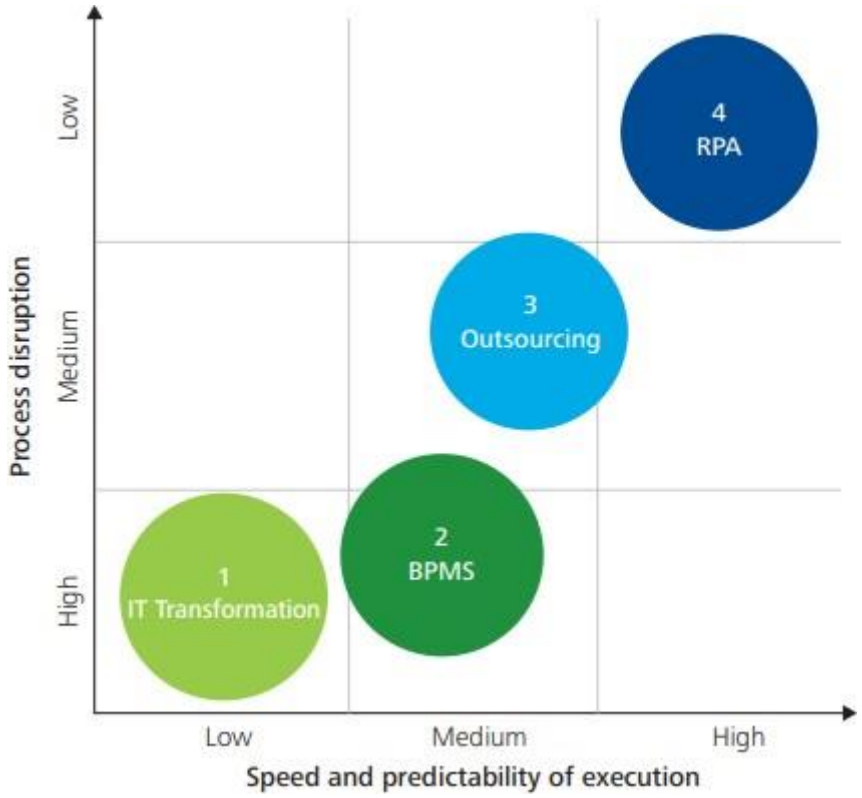

Figure 2. RPA positioning in compared to traditional transformation approaches (Deloitte 2016)

Figure 2 illustrates different types of automation approaches. All above depicted automation technologies and concepts are included in Business Process Automation. The selection of an automation method is evaluated depending on predictability or the simplicity of an operation. For more complicated processes, there is a need for a big scale IT infrastructure transformation or deployment of Business Process Management Software. RPA, on the other hand, is used to cover repetitive rule-based tasks, that do not require deep system penetration. To sum up, Business Process Automation uses all types of automation tools and techniques to streamline and automate the organizational processes on a large scale.

3.3 Business Process Outsourcing

Business Process Outsourcing is a technique used by businesses to eliminate their non-core processes by transferring certain organizational processes to external service providers. Through this practice companies achieve higher efficiency, as the outsourced operations are typically supporting functions, and by outsourcing them, businesses can concentrate on their core competencies. The primary advantage of BPO is the cost savings associated with lower labour costs. Companies leverage this advantage by outsourcing their processes to countries with lower wage rates, thereby fully benefiting from labor arbitrage (Taulli 2020: 16-20).

One could see a correlation between RPA and BPO, as BPO involves using people to cover non-core activities, while RPA deploys bots to handle rule-based and repetitive activities. While RPA can reduce the need for outsourcing to some extent, it cannot completely replace it. Nonetheless, companies can utilize bots to automate mundane and repetitive tasks and transfer the processes that require human intervention to external service providers (Taulli 2020: 16-20).

4 Robotic Process Automation

As we find ourselves in the boom of digitalization, Robotic Process Automation is considered as one of fastest-growing software technologies in history (Taulli 2020: xv).

This chapter serves as an introduction to RPA, covering various aspects including its definition, misconceptions, process selection, ROI reported by first follower companies as well as the limitations and challenges associated with RPA.

4.1 RPA. The Definition and Misconceptions

“The RPA value proposition is seductively simple – a tireless army of software robots (bots) that will work night and day to tackle the mountain of labor-intensive data entry work that sustains our digital world” (Taulli 2020: xv).

Van der Aalst, Bichler and Heinzl (2018: 269) define RPA as an umbrella term for software tools that mimic human actions on the user interface of other computer systems. Its goal is to automate tasks that are typically performed by people, utilizing an "outside-in" methodology. This differs from the conventional "inside-out" approach to improving information systems.

Lacity and Willcocks (2015: 3) imply that the Term “Robotic Process Automation” may invoke image of shiny robots moving around the office. However, it refers to software that can be programmed to carry out administrative tasks that typically require human intervention. These types of tasks may consolidate data from various input sources like email, spreadsheets and entering the data into systems like ERP and CRM. By referring to this as robotic software it highlights the functionality of the machine that can substitute a human worker and perform different, individual tasks.

The underlying difference of RPA in comparison to other business automation software is that it requires no need of programming skills, meaning that the simple business worker can start automating his processes after only few weeks of training (Lacity & Willcocks 2015: 4). Another major difference of RPA is that the software does not alter the existing information system as opposed to traditional workflow technology (van der Aalst, Bichler & Heinzl 2018: 271). Therefore, named by many as “Lightweight IT”, the software uses digital interface to start the program and build the processes by using its own building block which function as connectors to other systems and applications (Lacity & Willcocks 2015: 7-23).

As a consequence of being ”Lightweight IT” the software does not require complex technical skills, so it is often adopted by the business department themselves rather than being introduced by the IT sector. As a result, the threshold for automating processes is much lower since RPA projects do not need costly IT resources. Even for tasks that are only performed by a small number of people, RPA can be a cost-effective way to delegate the task to software robots (Lacity & Willcocks 2015: 7-23).

Furthermore, RPA is a cost-effective solution for integrating IT systems and improving operational efficiency, quality, cost savings, and employee satisfaction in the supply management according to (Flechsig, Anslinger & Lasch 2022: 11). It streamlines processes, reduces errors, and frees up time for employees to focus on strategic tasks. RPA can also potentially reduce the bullwhip effect and improve the buyer-supplier relationship. Successful RPA projects can accelerate the digital transformation of Purchasing and Supply Management and drive further automation across the enterprise (Flechsig, Anslinger & Lasch 2022: 14).

4.2 Process Selection Tools and Concepts

According to van der Aalst, Bichler and Heinzl (2018: 1-3) one of the main challenges in RPA project is to identify the processes that are best suited for automation. Especially, complex organizations require thorough analysis and informed decision making because of their complex architecture and processes. The operations can vary in characteristics such as frequency and length of execution, number of involved departments and stakeholders and variability of inputs and outcomes. As these characteristics can influence the potential outcomes of the automated processes, it is not practical to use RPA as a universal solution for all the processes (Geyer-Klingeberg, Nakladal, Baldauf & Veit 2018: 2-5).

Therefore, a thorough analysis of the processes is required before starting the RPA implementation.

To the date, there are few solid techniques to measure process suitability of RPA implementation (Geyer-Klingeberg *et al.* 2018: 2-5). One of these techniques that have already solidified its position is process mining. Process mining is a method of analyzing processes using data-driven techniques to visualize and reconstruct the actual flow of business processes using transaction logs that are generated by large IT systems (van der Aalst *et al.* 2012: 172).

This approach enables the identification of process patterns, bottlenecks, and compliance issues that may otherwise go unnoticed. The method utilizes data visualization components that allow users to examine the data in detail and identify any deviations from the ideal process. Through the analysis of event logs, process mining can pinpoint the tasks that are most frequently performed, take up a lot of time, and are prone to errors. These tasks can then be considered for automation using RPA (Geyer-Klingeberg *et al.* 2018: 1-2).

An interesting concept that van der Aalst, Bichler and Heinzl (2018: 270) include in contemplation of process selection is ”long tail of work”. This notion is also described by Imgrund *et al.* (2017: 603-606) who stresses that most companies tend to focus on improving only a small number of their processes and leave another which is a large part of their processes unaddressed. This phenomenon has been conceptualized in the theory of the long tail of business processes. According to the theory, companies concentrate on traditional Pareto distribution model which implies that 20% of the company’s processes (short head) provide 80% improvement potential. This means that lower value processes are often ignored as they are not deemed cost-effective to improve. However, the long tail of the processes provide 50% of the potential for improvement, rather than just 20% (Wanner, Fischer, Janiesch, Hofmann & Imgrund 2019: 3). As a result, companies need creative approaches to tap into the substantial improvement potential in the long tail of their process distribution. One possible approach is RPA, which can contribute to automating less valuable areas of the organization without high-cost investments and reduce the need for constant management and control which are needed in traditional automaton approaches (Wanner *et al.* 2019: 3).

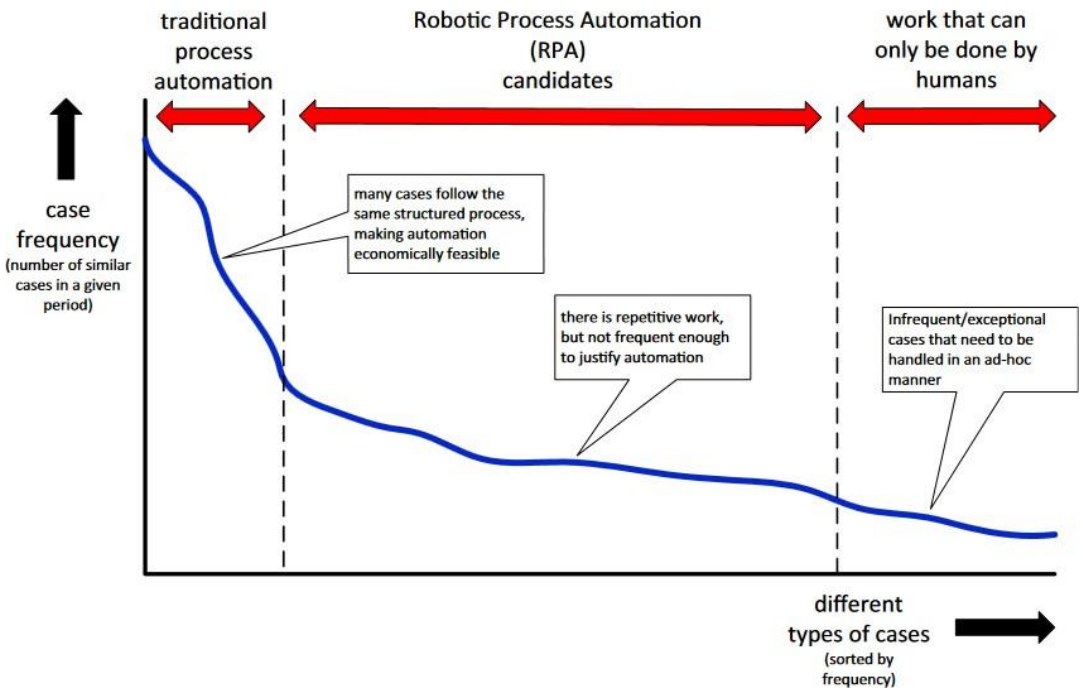

Figure 3. RPA positioning (van der Aalst, Bichler & Heinzl 2018)

Figure 3 shows the distribution of processes in respect to their frequency and process similarity. The short head of the processes depicts the cases with high frequency that also follow the same structure which makes them economically feasible to automate through traditional automation approach. The bigger part of the long tail entails the cases which are not as frequent and thus making them cost inefficient for traditional automatization. However, these cases make up the larger part of the organizational processes and neglecting them will not fulfil the potential efficiency goals of the company. Despite their infrequency the processes in the long tail are repetitive, making them a good candidate for RPA, which does not need high investment and control management in contrast to traditional automation (Imgrund *et al.* 2017; van der Aalst *et al*. 2018: 3-7).

The last portion of the cases are the processes that require manual handling and human decision making. With that said, RPA can be deployed to cover less frequent, rule-based, repetitive tasks, while traditional automation covers highly frequent complex system and human will take control of more analytical, strategic processes thus acting as a bridge between different IT systems (van der Aalst *et al*. 2018: 270).

4.3 RPA Return on Investment

Robotic Process Automation shows gigantic ROI as result provided by first follower companies that implemented RPA. A case study on Telefónica O2, a mobile communications provider in the UK, revealed that they deployed over 160 robots to handle between 400,000 and 500,000 transactions per month, resulting in a return on investment of over 650% in three years (Lacity & Willcocks 2015: 4-5). The more surprising fact of this study is that only 4 individuals were trained to manage this operation. Another case study featured a large UK- based utility that implemented over 300 robots to process three million transactions each quarter, generating an annual return on investment of 200%. In this case, two people oversee the work of 300 robots, which replaces the need for 600 human workers (Lacity, Willcocks and Craig 2015: 4). It is important to mention that this immense ROI will not result in the same numbers in other companies. Some industries are more prone to rule-based repetitive tasks which are perfect candidates for automation.

One more example of an organization that generated positive results with deployment of RPA is a german company Deutsche Telekom (DT). Deutsche Telekom is one of the largest telecommunication companies around the world and operates in 50 counties with 200 million customers (Schmitz, Dietze & Czarnecki 2019: 17). The project was directed to a specific unit of DT, namely Deutsche Telekom Technical Services GmbH (DTTS), which is responsible for technical processes such as maintenance, fault management, dispatching and performance measurement just to name a few. As a result, the DTTS successfully deployed a platform with over 1000 RPA clients, resulting in savings of 800 full-time equivalent employees (FTE). This led to a ROI in less than three months and cost savings of 60-80% in the areas where the RPA clients were implemented, where the automation of a single end-to-end process typically took 6-8 weeks on average (Schmitz, Dietze & Czarnecki 2019: 26-27).

4.4 Understanding RPA Limitation and Challenges

According to a report by Gardner Inc., the initial excitement and hype surrounding RPA have diminished, resulting in limited adoption and causing disappointment and skepticism regarding its potential advantages (van der Meulen 2020). Moreover, the core capabilities of RPA, which involve automating routine, rule-based, and predictable tasks, are most effective in organizations that rely on legacy systems. However, even for these companies, investing in new systems aligned with long-term goals is often more beneficial than allocating resources to RPA. Therefore, it is important to consider RPA as a quick and effective mid-term solution rather than a long-term strategy (van der Meulen 2020).

Moreover, according to the report of Global RPA Survey 2019 (Protiviti 2019), implementation of RPA faces a good portion of challenges. Some of the challenges listed at a corporate level are inability to assess priorities, selection of suitable development platform, insufficient internal staff skills, high implementation costs and data security (Choi, R’bigui & Cho 2021: 301-303). The list of challenges in expanded from are registered in the table 2.

Table 2. RPA challenges in detail from different organizational perspectives (Choi, R'bigui & Cho 2021)

Perspective	Challenges	Comments
Organizational perspective	Prioritizing potential RPA initiatives	Identifying where RPA is highly likely to provide significant value is challenging. The huge effort will be in this stage when implementing RPA. A poor choice of processes to be automated may result in implementation failure. Approaches for identifying the suitable processes to be automated is strongly required
	Aversion to risk	Most of organizations prefer not to take the risk in adopting a technology emerging. This can be overcome by applying RPA to many areas as case studies
	Limited RPA Sills/talent	RPA is still an emerging technology. Therefore, there is a lack in skilled people in RPA
	Little sense of urgency	It might take a long time to decide implementing RPA for organizations having a little sense of urgency. Many use cases are important to serve for the growth of RPA implementation
Technical Perspective	Cybersecurity/data privacy	Cybersecurity and data privacy were always considered crucial. RPA is based on mining user interface data that may include private information. Thus, there is a need for a secure RPA development
	Scaling applications	When automating a core business process with RPA and finding that the business is growing rapidly, if that automated process cannot scale as required, the RPA technology can become an obstacle for growth. Therefore, techniques to make the scalability easy is needed
	Deciding on best applications	Ensuring that you are using the right application can be very challenging. There is a need for benchmarks on how to decide the best application

(continued)

Table 2 (continued)

Perspective	Challenges	Comments
Financial and regulatory	Implementation costs	Process analysis phase takes a long time in the implementation process. By speeding up this phase, one can reduce implementation costs. So, approaches for accelerating the process analysis phase are needed
	Convincing business case	A considerable number of use cases is needed to convince businesses
	Regulatory constraints	New technologies are required to meet regulatory constraints

RPA has proven to be a valuable tool in achieving business objectives and managing business data due to its relatively straightforward implementation. However, the widespread adoption of RPA in businesses requires more time and effort. Examining the challenges faced in implementing RPA highlights the areas that companies need to focus on. It is crucial for organizations to have a strong commitment to business transformations, well-defined management strategies, effective control measures, robust security protocols, operational stability and reliable methods for handling exceptional scenarios. These factors play a pivotal role in ensuring the successful deployment and utilization of RPA within the business environment (Choi, R'bigui & Cho 2021: 303).

4.5 Microsoft Power Automate

Power Automate is the selected tool for this study and it is utilized for the pilot automations in the implementation chapter. Microsoft Power Automate is a programming platform that allows for the creation of automated operations using a "low-code" approach. This emphasizes its user-friendliness for citizen developers. The development process is made easier through a graphical interface that includes various prebuilt templates and connectors. If a required connector is not available, users have the option to create their own connectors for specific software (Pearson, Knight, B., Knight, D. & Quintana 2020: 73-78).

Additionally, Power Automate presents a solution for organizations that rely on legacy systems, posing challenges in integrating them with modern software. By utilizing Power Automate, organizations can create personalized connectors that act as a link between these legacy systems and enabling process automation. Moreover, the collection of available connectors and templates enables citizen developers throughout the development process to connect with major applications and services (Pearson *et al.* 2020: 73-78).

The user-friendly nature of Power Automate is intentionally designed to empower and provide confidence to all office workers in deploying and constructing their own work processes. This has a secondary benefit of relieving the IT department from the burden of managing automation processes, as they can now be handled by any office worker (Pearson et al. 2020: 73-78).

Power Automate interface consists of various resources, below are presented the main features that describe the functioning of the platform:

Connectors: these are the building blocks that allow the process to connect to Microsoft 365 apps and services (Teams, Excel, SharePoint), as well as to any other third-party software or service (ERP, emails, databases).

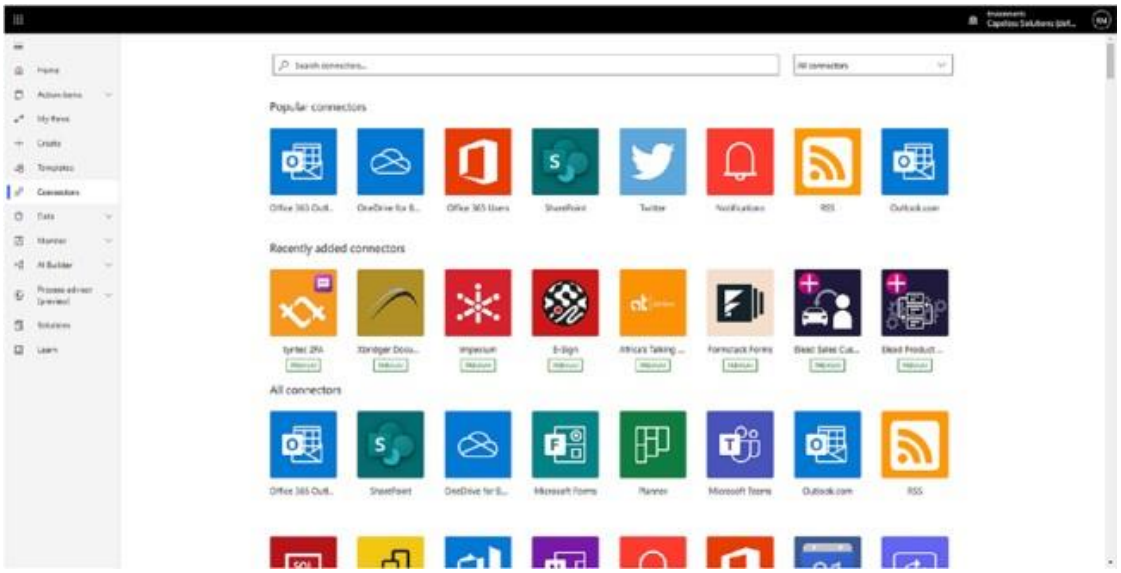

Figure 4. Power Automate connector library (Mercurio & Merrill 2021)

AI Builder: This feature permits the addition of artificial intelligence to your workflows, which can be utilized to extract data, identify objects, or make predictions.

Solutions: This feature enables the importing of pre-built solutions from the marketplace or software providers, which can then be utilized within the Power Automate platform.

Proser Advisor: The support of processes advisor consists in identifying the errors in flows in order to correct and improve the flows (Mercurio & Merrill 2021: 281-289).

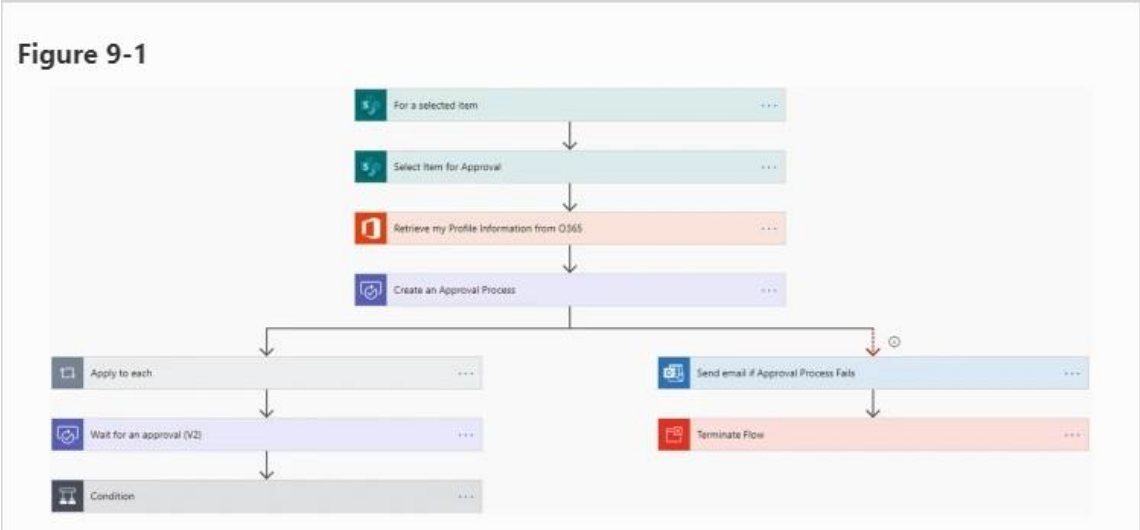

Figure 5. Visual depiction of an automated workflow (Pearson et al. 2020)

For those unfamiliar with the platform, it can be confusing to learn that there are two types of Power Automate available: Power Automate Desktop and Power Automate Cloud. The next chapters differentiate implications of these two versions.

4.5.1 Power Automate Desktop

Desktop processes are used in automating legacy applications that do not have APIs, the ones that are deployed for years by the companies and considered outdated. These types of application tend to face complications in connecting with modern software. In case when a company wishes to automate their processes but operates still on outdated software, Power Automate Desktop provides the capability to automate such processes.

Power Automate Desktop is a software application that needs to be installed on a computer running Windows. In fact, it is automatically installed in Windows 11. Unlike Cloud flows, which are executed in the cloud through a browser, desktop flows run locally on the system or desktop. Desktop automations commonly involve a process called "screen scraping," where the human performs clicking actions and follows the needed patterns to create a recorded sequence that can be repeated automatically by a bot.

4.5.2 Power Automate Could

Power Automate Cloud is mainly used for more modern applications that have APIs and is used through web browsers as designer interface. Moreover, the cloud flows serve as orchestrators for the desktop flows that are created using Power Automate Desktop. This means that the flows developed with Power Automate Desktop can be synchronized with cloud flows and all flows can be executed through web browser from any location. The ability to synchronize and execute flows remotely through the cloud provides increased flexibility and accessibility for the user. This feature allows seamless integration between the desktop and cloud environments, enabling a more streamlined and efficient workflow. There are various types of cloud flows including automated cloud flows, instant cloud flows and scheduled cloud flows. Automated cloud flows are triggered by specific events, initiating their execution. On the other hand, instant cloud flows are initiated by the user, while scheduled cloud flows run on a certain given schedule.

There are 3 components that differentiate PA Cloud Flow:

The **trigger** serves as the starting point for every process in the cloud flow. It is the component that initiates the execution of the flow. The developer has the flexibility to select the specific event or condition that will serve as the trigger for the process. This allows the developer to customize the flow and determine the specific event or action that will activate the process (ex: receiving an email).

The **action** component represents the tasks or operations that are performed once the trigger event has been executed (ex: when the email is received, the components of the email will be saved in excel).

Conditional Logic allows developers to insert conditions to the flows by allowing "if-then-else" statements to the process. (ex: if the email comes from the manager, save it to different folder) (Pearson *et al.* 2020: 73-78).

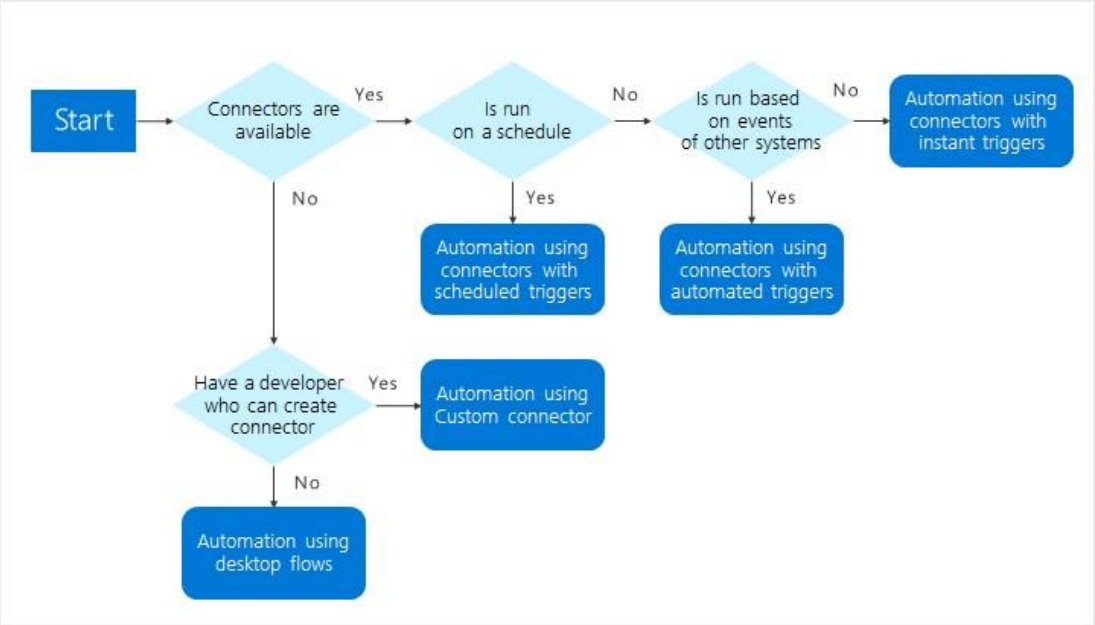

Figure 6. Decision-making flow chart in Power Automate (Yoshida & Osborne 2022b)

Figure 7 shows a decision-making diagram while automating with Power Automate software. The diagram flows in a straightforward way, which depicts the simplicity of decision-making while using Power Automate.

4.5.3 Attended and unattended environment

Regardless of the type of automation method employed, the resulting automation can be categorized as either attended or unattended.

Figure 7. Attended and unattended scenarios (Yoshida & Osborne 2022a)

Attended desktop flow: In attended flows, the automation is carried out while users are present at their computers. This type of automation is appropriate for automating tasks and processes at an individual level. The automation is typically initiated manually by the user whenever he needs to run it. During the process, there may be a need for human interaction or decision-making between steps.

Unattended desktop flows: These types of flows do not require human intervention, instead a specific computer or server is configured to execute the automation. The entire automation process is controlled by bots, without any human decision-making (apart from approval flows). Automation can be triggered automatically by other systems or services or can be scheduled to run at a specific time.

Unattended bots are an expensive acquisition which are deployed to carry on the work while the user is not present. However, while unattended bots are considered as formidable supporters, they can only be deployed in desktop flows. Nevertheless, cloud flows also possess similar features such as automated flows which react to an event and automatically perform the action.

4.5.4 Power Automate Pricing

The pricing structure of Power Automate is complex, as portrayed in Figure 4. The prices are dependent on the technical capabilities of Power Automate, but delving into the technical aspects is not necessary for comprehending the pricing structure. To simplify the pricing of Power Automate, it can be divided into three categories.

Firstly, Power Automate is bundled with various versions of Office 365 and is also a part of the Power Platform. The Power Platform subscription encompasses additional tools like Power BI, Power Apps, and Power Virtual Agents. When it comes to Power Automate in Office 365, users have access to free triggers and actions primarily related to Microsoft applications and software. However, it is important to mention that this subscription does not include premium connectors, such as integrations with Azure, SQL Server, or AI Builder.

Table 3. Power Automate Pricing (MS Power Automate 2021)

	Per user	Per user with attended RPA	Per flow
Licensing scheme	Unlimited flows per user	Unlimited flows per users	Unlimited users per flow
Cloud flows and business process flows	Included	Included	Included
Attended desktop flows (including Power Automate Desktop)	Not included	Included	Not included
Unattended desktop flows	Not included	Not included	Not included
AI Builder	Not included	5,000 service credits per month	Not included
Usage limit	5,000 daily API requests per user	5,000 daily API requests per user	15,000 daily API requests per licensed flow
Typical use case	To support the adoption of automation across the entire organization	Similar to per user case, but with additional RPA capabilities	To support the implementation of flows that are used by a large number of users
Price	US$15 per user per month	US$40 per user per month	US$100 per flow per month
Minimum purchase	N/A	N/A	5 flows

The second method of acquiring Power Automate is on a "per user" basis. This option costs $15 per month and grants access for a single user to the Power Automate platform, including premium connectors.

The third option is "per flow" subscription, which involves purchasing an automated flow that can be used by multiple users. The pricing for this type of subscription varies based on the specific flow and its usage requirements. Within the scope of this study, Office 365 E5 deployment is utilized.

5 Process Development

In order to ensure a successful deployment of RPA and mitigate potential implementation challenges, it is imperative to carefully plan each step in accordance with established RPA development standards. This chapter will primarily focus on the crucial aspect of expertly researched process development, which holds significant importance for companies that plan RPA deployment on an enterprise-wide scale. Subsequently, the second section of this chapter will outline the specific characteristics of RPA implementation in the context of small-scale, single-process, or individual task automation.

5.1 Standard mapping out and implementation of RPA

The following framework for RPA implementation is taken from the research investigation of (Herm *et al.* 2022), which was conducted through literature review, expert interview study and multiple workshops.

The RPA project goes through three phases. The first is the initialization phase, where identification, alignment, and technology screening are completed, and the implementation phase begins with process selection, RPA software selection, RPA pilot, and business case evaluation. If the project is not run entirely by an external consultancy, external consultants may be involved in these stages. The implementation phase completes all these stages and concludes with the RPA rollout. The scaling phase only starts after the RPA project is complete and focuses on the adoption and scaling of results for further RPA implementations. All the stages are continuously backed by RPA support processes and a Center of Excellence (CoE).

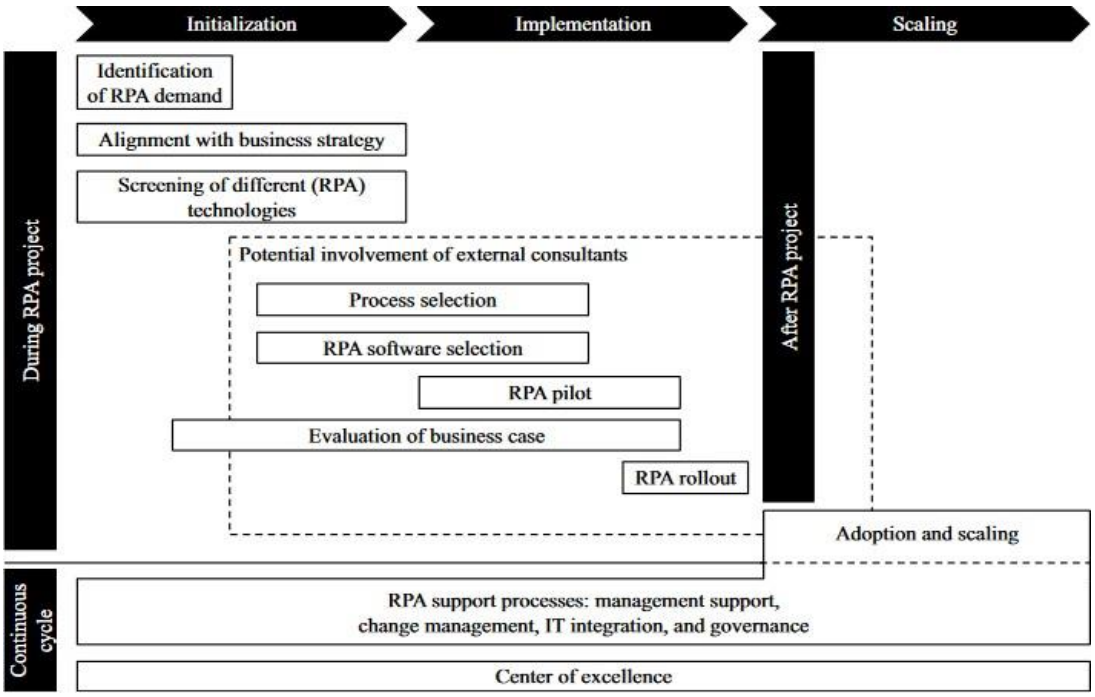

Figure 8. Framework for RPA implementation projects (Herm et al. 2022).

Identification of RPA demand: The initial stage of process automation involves identifying the processes that need to be automated and opportunities for automation. This can be achieved through various methods such as workshops, surveys, reviews, and document analysis. Conversations within departments can also help to determine the need for automation. Depending on the level of digitalization, companies can use existing IT and process and task mining to identify processes that should be automated. This helps companies to evaluate the need for digitalization and consider the maintenance of their processes within their IT infrastructure.

Screening Phase: The screening phase involves determining if RPA can be effectively used and which technology is most suitable to address the problem. This may involve discovering that RPA is not the best option for automation.

While RPA is often viewed as a temporary solution, it can be a mid-term option if establishing and integrating APIs is currently not possible.

Process Selection: This stage involves selecting the processes that are best suited for automation with RPA. To make better decisions, information from end users and stakeholders is required. Experts recommend starting with back- office processes in departments such as accounting and finance, and processes with low complexity are preferred for initial implementation and testing. The degree of standardization, process stability, and frequency and volume of processes are also important considerations. Processes prone to human errors, ensuring flexibility due to retirements, and providing new services to customers can also be indicators of good candidates for automation.

RPA Vendor Selection: In this stage, the focus is on choosing the appropriate RPA software for automation. Factors such as software, skill requirements, as well as prior successful implementations are important considerations in decision-making. However, the market is evolving rapidly, which means that organizational factors are increasingly more significant for software selection than technical factors. Other factors that must be taken into account include skills availability (such as external consultants), community support, vendor support, vendor reputation, ability to develop software robots using low-code programming, software maturity, manageability, security, data protection of RPA cloud solutions, and the availability of free tiers and license flexibility.

RPA Pilot: Pilots are implemented to assess the feasibility of RPA technology for a specific case, and their lightweight nature means that the code can often be used for production long-term. Pilots serve to verify the functionality, technical feasibility, and financial viability of RPA technology, and are used to demonstrate RPA to stakeholders before being transferred to production.
Verification factors may include process quality or return on investment calculations, and it is recommended that a pilot should be executed for several months to provide a detailed data-driven analysis.

Evaluation of Business Case: The business case serves to bridge the gap between the RPA pilot and the subsequent adoption and scaling of RPA services within the company. To facilitate the adoption and scaling, Dutta, Gillard and Kaczmarskyj (2016) and Willcocks, Lacity and Craig (2015) as cited by Herm *et al.* (2022), emphasize that it is crucial to obtain long-term support from management. This can be achieved by taking into account metrics such processing times, error rates, infrastructure, and IT costs (Fersht & Slaby 2012 as cited by Herm *et al.* 2022).

RPA Rollout: The RPA rollout is the process of making the implemented software robot(s) available and operational in the daily operations of the company. This stage involves tasks such as granting the software robot necessary rights and ensuring that it is accepted by its co-workers. Additionally, the RPA rollout may involve specific training for employees, internal communication through newsletters, and sensitization to increase employee acceptance, resulting in increased proactivity towards identifying further opportunities for automation.

Adoption and Scaling: Once the RPA pilot and a clear business case have led to a successful RPA rollout, the RPA portfolio can be expanded. This can be achieved by creating RPA libraries and templates which can facilitate the automation of more complex processes over time, allowing the RPA team to gradually understand the feasibility of automating different corporate processes (Schmitz, Dietze, Czarnecki, Urban & Roeglinger 2019 as cited by Herm *et al.* 2022). It is important to involve employees early on to maintain a positive attitude towards software robots. As the number of RPA projects increases, adoption and scaling become a continuous cycle of RPA support processes. Along with that, it is crucial to involve employees who will be affected by the implementation of software robots from the early stages of the project to ensure that they are fully informed and have a clear understanding of the benefits and implications of the change (Lacity, Willcocks, 2017 as cited by Herm *et al.* 2022).

RPA Support Processes: Furthermore, ongoing support from management is crucial for the success of an RPA project. This includes financial support and a strategic understanding of the capabilities and limitations of software robots. Additionally, establishing governance guidelines and providing IT support at the beginning of the project can help reduce obstacles during scaling. Change management, including the retirement of robots and IT integration, is also important for ensuring continuous improvement and cooperation between humans and machines. These factors help ensure the smooth operation and maintenance of RPA in production.

Center of Excellence: To implement software robots using RPA, a CoE should be set up to define necessary roles and skills (Lacity, Willcocks & Andrew 2015 as cited by Herm *et al.* 2022). The CoE's tasks include monitoring and maintenance of software robots, identifying further processes for automation, process innovation, and efficiency improvements (Anagnoste 2018; Aguirre and Rodriguez 2017 as cited by Herm et al. 2022). The CoE is typically not anchored in the IT department but on the business side and requires resources, so it's usually feasible for large companies only (Anagnoste 2018; Willcocks et al. 2015b as cited by Herm et al. 2022). Small and medium-sized enterprises can make available at least one full-time equivalent to manage RPA knowledge and projects. Establishing a CoE should commence with the RPA software selection stage at the latest and considering it only when scaling will lead to inefficiencies.

5.2 RPA Implementation for a Citizen Developer

The implementation process for a citizen developer varies from that of an entire organization and is characterized by a less formal approach.

To begin the automation process, the citizen developer needs to identify the specific task or tasks that require automation. Next, a suitable RPA tool must be carefully selected from the various options available in the market. While most RPA providers offer similar core functionalities, there may be variations designed to serve individuals with different skill sets.

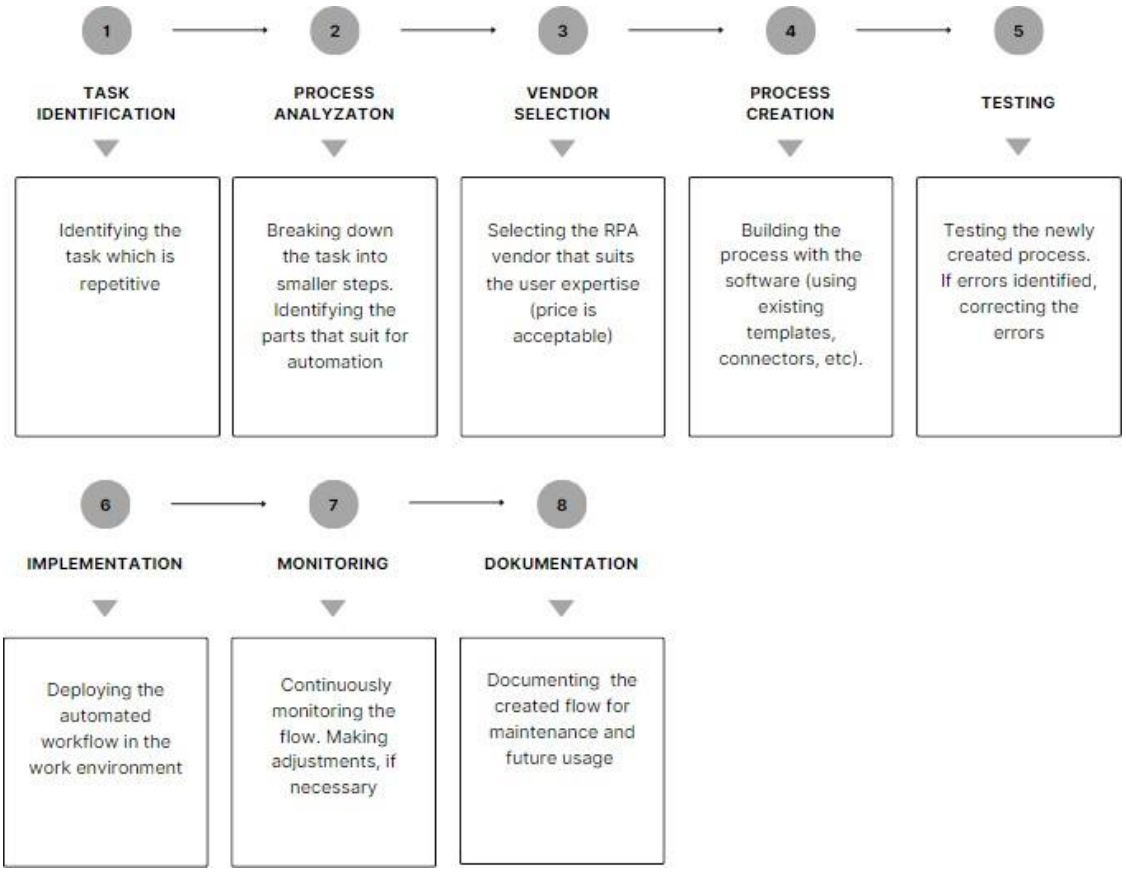

Figure 9. Process creation steps for a citizen developer

Due to the scarcity of professional literature dedicated to RPA development specifically for a business user developer, the author of this study has compiled information from multiple sources and integrated his own methodology. The objective is to present a set of unofficial steps for automating processes at the citizen developer level, as depicted in Figure 7. These steps will be utilized in the implementation chapter of the study, although with certain modifications.

It should be noted that certain steps may be excluded in this study's RPA development approach, as it assumes a simulated methodology. For instance, vendor selection is not required as the decision to utilize the Power Automate platform has already been made.

6 Empirical findings and implementations

In this chapter, a series of interviews were conducted with employees from distinct companies. The purpose of these interviews was to gather insights into their experiences and perspectives regarding automation. Additionally, the chapter delves into the identification of specific processes that were deemed suitable for automation. Furthermore, an evaluation of the automated processes is provided, offering an analysis of their effectiveness and impact.

6.1 Interviews

The study conducted a total of three interviews with individuals from different business sectors, namely Procurement Services, Educational Consulting, and Financial Services. The interviews followed an unstructured approach, with a primary focus on establishing a common understanding of Robotic Process Automation and its capabilities. The interviewees were asked about their knowledge of RPA and their ability to recognize repetitive and mundane tasks within their respective organizations. The main objective of these interviews was to identify any rule-based tasks that the employees wished to automate. If such tasks were identified, they were described in detail to enhance the comprehensive understanding of the process for the attempt of automating it in a simulated environment. It is worth noting that to maintain confidentiality, any sensitive information related to the companies was intentionally omitted, modified or simplified.

6.1.1 Interview with Company W

The first interviewee is employed at a Luxembourg-based company that operates within the business-to-business (B2B) sector and specializes in providing consulting services. The focus of the company is to assist partners in optimizing their procurement processes, leveraging collective purchasing power and driving cost efficiencies through collaboration.

As a collaborative purchasing group, they facilitate effective communication and negotiation between suppliers and their client companies, aiming to achieve mutual benefits and streamlined procurement operations.

The interviewee holds the position of account manager in the company. The account manager's responsibilities primarily involve handling customer data and related tasks. During the discussion, it was indicated that the interviewee is familiar with the concept of automation in general but has not specifically encountered RPA before. Additionally, it was mentioned that the company's management board has discussed the possibility of automating certain processes, but currently, most tasks are still performed manually.

Within the context of repetitive and rule-based tasks, one specific operation was identified, which then was divided into two separate processes to ensure clear understanding of details within the process. Current employee receives customer data via email in the form of Excel files. Since customers use various software, the data often requires formatting due to errors in the text or visibility issues caused by incorrect formatting. This possess challenges as any incorrect entry or duplication of supplier names in the database can lead to inaccurate information. The information in the database is used for analysis purposes, maintaining data accuracy is crucial for the company to produce reliable outcomes. As a result, it was decided to divide these operations into two flows: “receiving and formatting a document” and “dynamically extracting the specific data from the new document into the database”.

6.1.2 Target Process Formulation

The first part of the process, namely formatting, can be handled in various ways. However, it was decided to follow the recommended approach of utilizing existing software solutions before resorting to RPA. This approach suggests leveraging the capabilities of the current software to address automation requirements before considering the implementation of RPA (Eskelinen 2019: 69).

Following this concept, the chosen method involves employing Microsoft's Office Scripts, an extension available within the Excel application. Office Scripts allows the automation of a predetermined sequence of actions performed within Excel. Consequently, by utilizing Office Scripts, formatting can be recorded and automated for various Excel files. Thereafter, the recorded script within Excel is integrated into a Power Automate flow, enabling automatic execution.

The proposed plan involves a series of automated steps for handling incoming Excel files. The first step is to automatically save the files to a database and apply formatting. Subsequently, an employee is assigned the responsibility of verifying the file's content to ensure its correctness and determine whether it should be transferred to the main data repository. Once confirmed, the employee initiates a Power Automate workflow by moving the file into a specific folder. This workflow extracts the specific data from the file and inserts it into the database.

After the successful insertion of data into the database, the next task is to categorize the content. Further, Excel formulas will be utilized to categorize the content into predetermined categories.

6.2 Interview with Company M

An interview was conducted with the director of an education consulting center. The education consulting center boasts a remarkable 30-year experience within the industry. The primary service offered by the center revolves around providing guidance to customers seeking suitable countries and universities for their educational pursuits at various levels. Additionally, the company takes responsibility for the entire application process and manages communication with educational institutions and legal authorities on behalf of customers.

Despite its small size, the company leverages extensive experience to effectively manage operations. The repetitive nature of tasks has enabled the company to develop expertise in executing them efficiently and with a high level of professionalism.

During the meeting, it became evident that the primary focus would be on improving the documentation and data collection processes within the organization. The interviewee revealed that the company conducts annual workshops, which attract a considerable number of potential customers. These workshops serve as a platform for visitors and interested customers to seek consultation and program selection for their studies. Correspondingly, these workshops present a valuable opportunity to gather extensive data.

Currently, the organization relies on two primary methods for data collection. Firstly, data is collected through in-person visits for registration. Secondly, the organization's website provides a platform for customers to enter their information. The collected data is then extracted and stored as an Excel list of customers. However, this process has proven to be less efficient than desired. Each time the data is extracted, formatting issues arise, resulting in a new Excel file with disrupted formatting. To overcome this challenge, employees maintain a central Excel file for data storage. They continuously transfer new data to this main database in an attempt to streamline the process.

6.2.1 Target Process Formulation

During the process evaluation, the need for process optimization was recognized and a decision was made to develop an efficient system for collecting customer data through online applications. This approach aims to reduce the time spent on in-person customer visits and streamline the data collection process. Additionally, an effort will be made to store the collected data in a well-organized manner within the database to enhance the accessibility and management of customer information. Furthermore, the integration of document collection will be incorporated into the primary process to ensure a cohesive workflow.

6.3 Interview with Company T

The third interview was conducted with a regional manager employed by a large financial institution. The institution operates in an online ecosystem and is known for its extensive range of services. As a regional manager, the interviewee's responsibilities include managing field employees who engage with customers to offer necessary products and services. While the interviewee had not previously encountered the concept of RPA, he was enthusiastic upon learning about the software's capabilities, particularly the ability to create his own flows with minimal assistance of the IT department.

In the context of this study, no specific processes within the interviewee's operations were identified as suitable RPA implementation. This is largely attributed to the institute’s advanced level of automation across most of its functions. Nevertheless, despite a suitable task for RPA implementation not being identified, the interviewee expressed an interest in exploring the software capabilities to potentially optimize his work in the future.

7 Implementation and Discussions

The implemented processes were conducted in a simulated manner to showcase the technical capabilities of the automation technology in different scenarios. The data used in the simulations was purely for demonstration purposes and served as a sample. The flows, naming conventions, file management, and categorizations were kept simple to put more emphasis on actual automation and task optimization with minimal programming. The main objective of these simulations is to provide a clear understanding of the automation path, enabling users to modify and enhance the flows, integrate them with other processes, or expand their functionality as needed.

Moreover, to accurately replicate the business environment and portray the processes as they occur in real-world business scenarios, the Microsoft Office 365 E5 subscription was utilized. This allowed full access to the comprehensive range of software and application capabilities available within the Office 365 suite.

7.1 Company W Process Automation

First flow

The desired process flow is initially visualized through a flow diagram, outlining the approximate steps to be taken, see Figure 10. During the process creation phase, the focus is on implementing the formatting of the document. Since incoming files may have varying formats, it is impractical to concentrate on a specific formatting type. Therefore, for the scope of this study, it has been decided to adopt a formatting approach that removes all existing formats within the file, creates a clean header, automatically adjusts column and row sizes, and adds a table at the end.

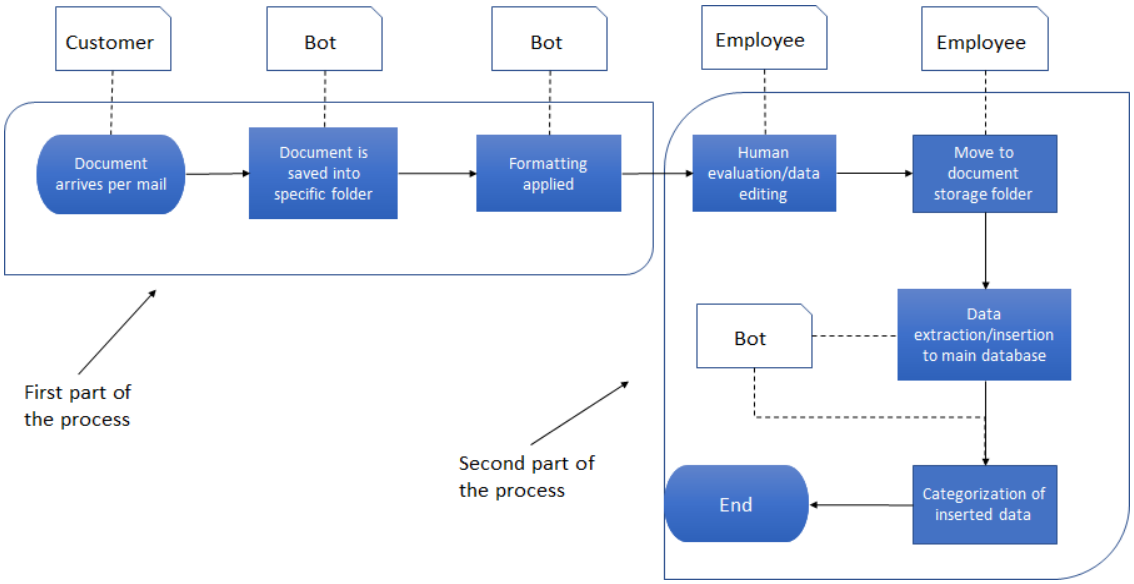

Figure 10. Depicted process flow of Company W

The inclusion of a table is necessary as Power Automate exclusively executes actions like data extraction and insertion (to) from Excel only within a table framework. Although there are different approaches to inserting a table in Excel, such as directly within the Power Automate flow, it has been decided to incorporate it as part of the formatting process. As a result, the actions of formatting and table creation are performed using Office Scripts.

After finalizing the desired formatting within Office Scripts, the creation of the first flow is started. The trigger is established through Outlook, specifically when a new email arrives. The trigger selectively responds to specific emails, particularly those that include specific wording in their subject and attachments. Users have the flexibility to adjust this configuration to align with their specific workflow requirements, see figure 11.

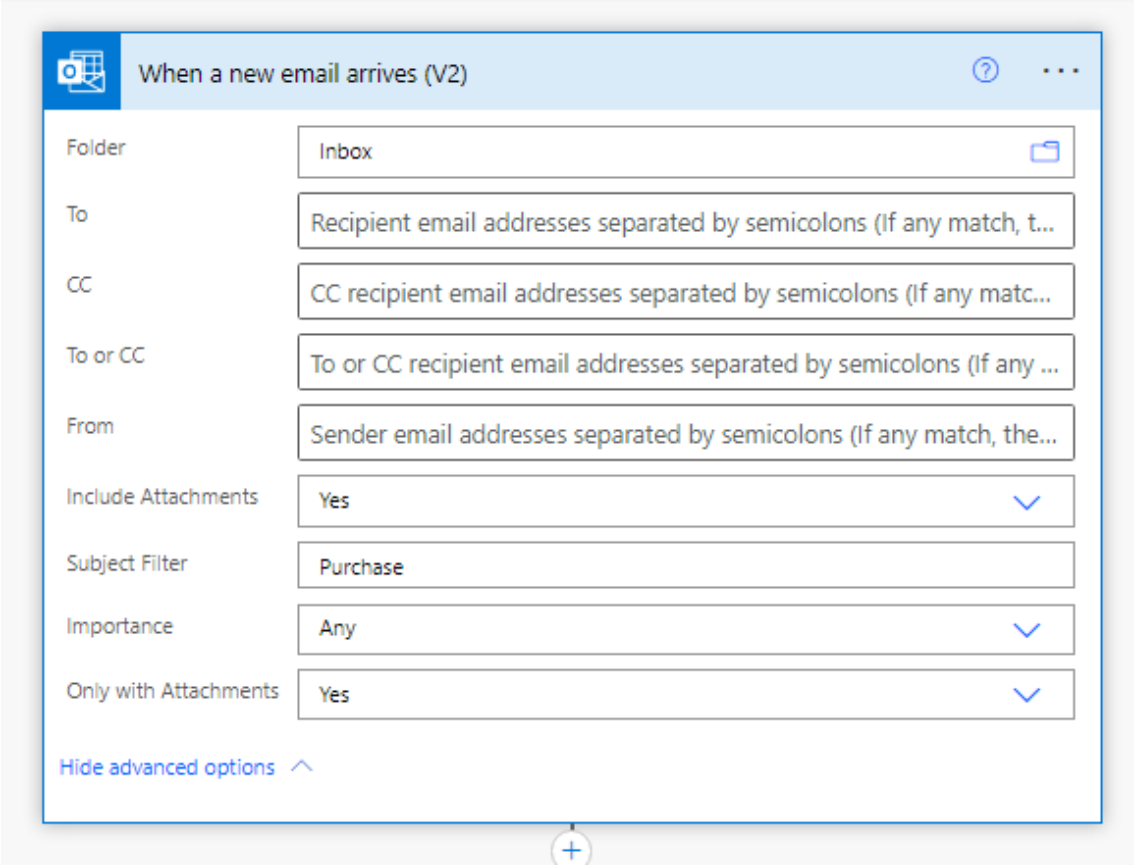

Figure 11. Email trigger set via Outlook

Further, the document is saved in OneDrive utilizing the "create file" option. Throughout this procedure, the preferred folder path is specified, and dynamic file naming and content are chosen. The creation of the file in OneDrive is shifted into the control "Apply to each" as multiple items are retrieved, see figure 12.

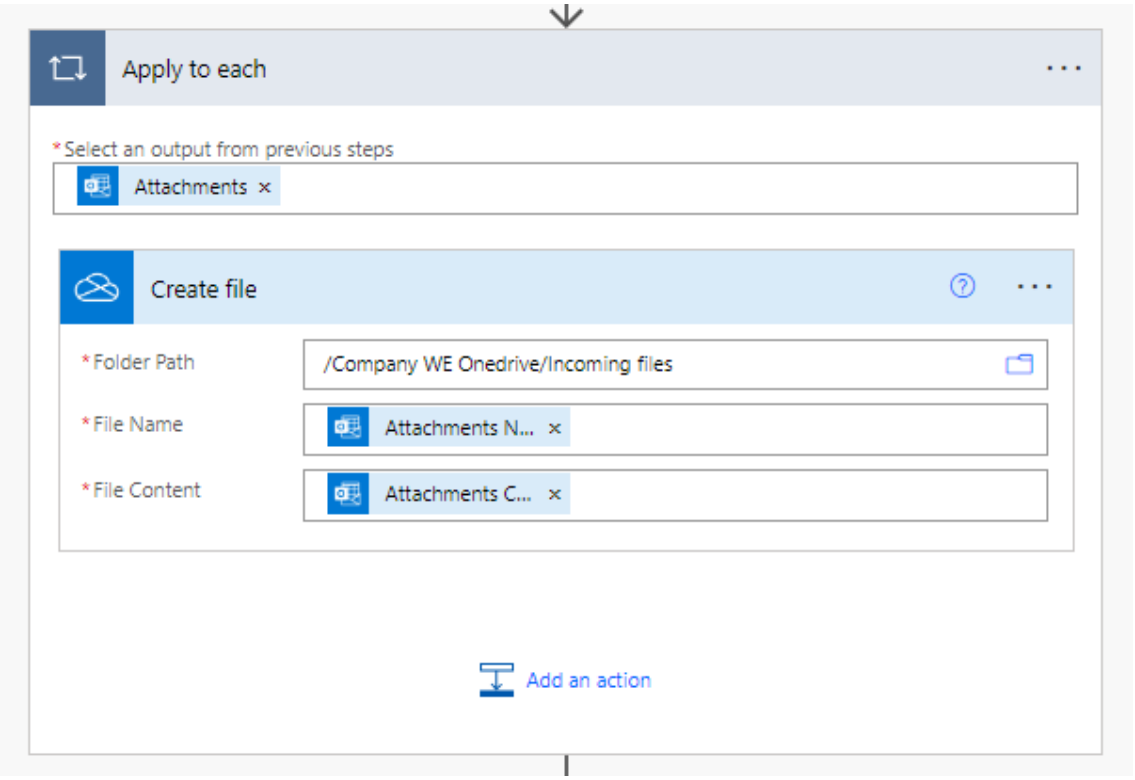

Figure 12. ”Create file” action set via OneDrive included in ”Apply to each” control

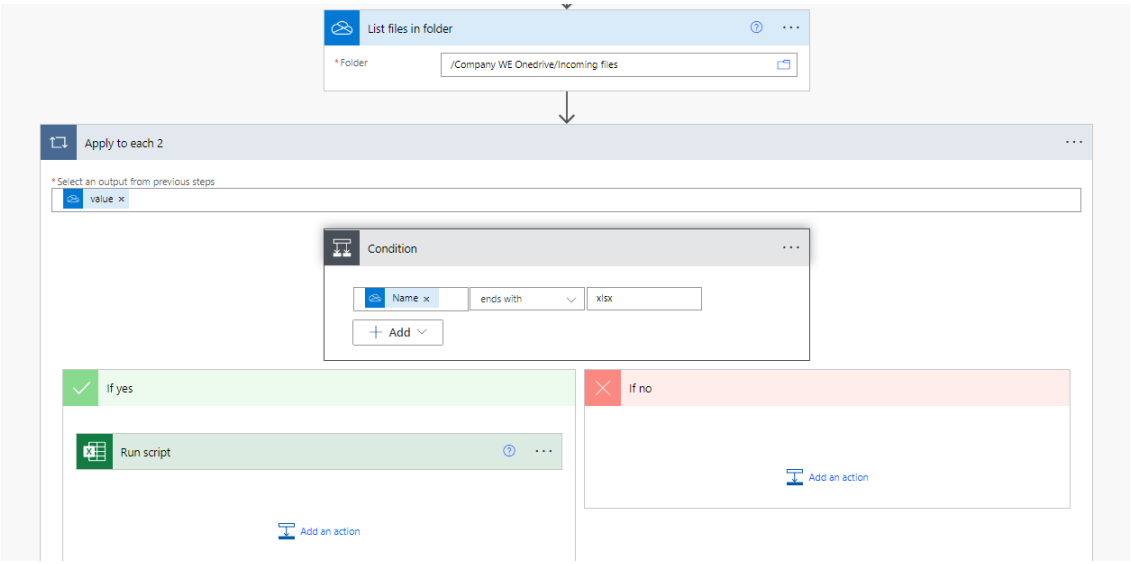

Figure 13. ”List files in folder” action moves into condition which is inside ”Apply to each” control

Next, the process continues by adding the "List files in folder" action using the OneDrive connector. This action involves specifying the folder where the files are located, which serves as the foundation for the following steps. Additionally, the "Condition" control is utilized to establish a condition that determines the format of the files. The selected condition specifies that the file name must end with "xlsx," ensuring that only Excel files within the designated folder proceed to the next step, see figure 13.

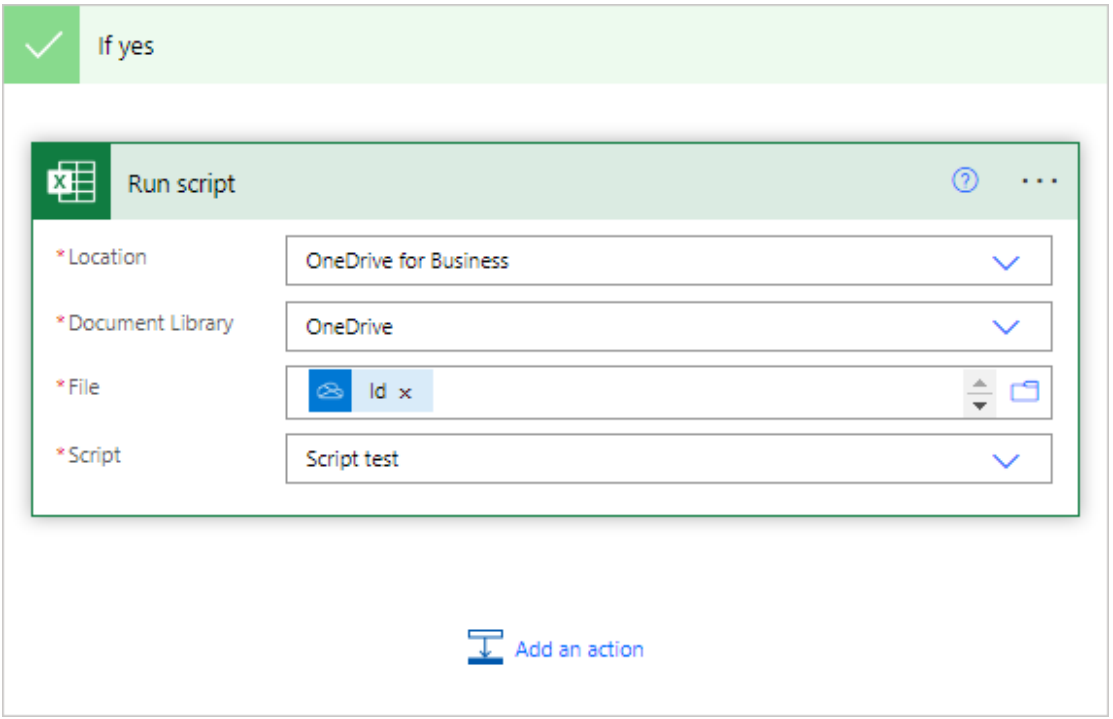

Figure 14. ”Run script” action set via Excel Business connector

In this step, the created Office script is executed to apply the desired formatting to the document. Therefore, in the "Run Script" action, the location of the file and the dynamic file ID from the dynamic content are selected as well as the script that has been created in Excel. With these configurations in place, the initial flow is now prepared for execution, see figure 14.

Second flow

Upon the successful execution of the first flow, which results in saving the incoming file and formatting it according to the predefined format, the development of the second flow is initiated.

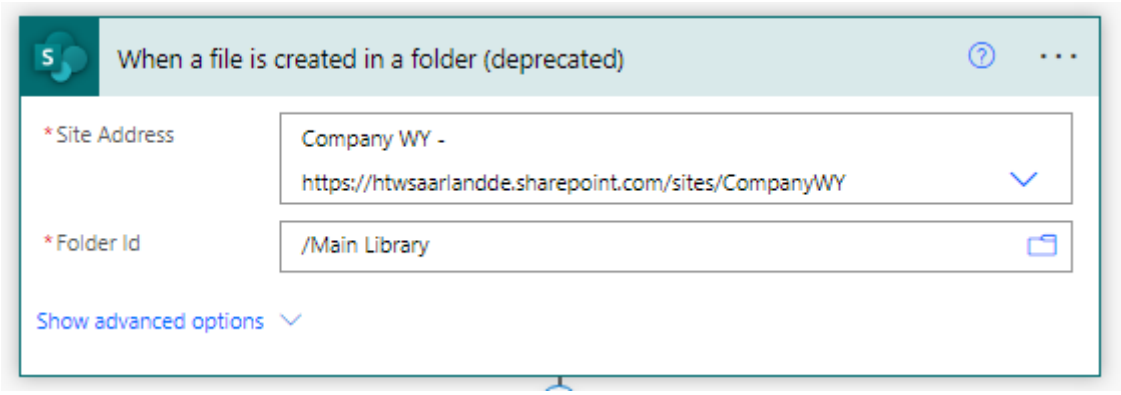

Figure 15. Trigger set via SharePoint

The trigger for this flow is set with "when a file is created in a folder" SharePoint connector, indicating that when an employee evaluates the file and moves it to the designated storage folder, the flow is triggered, and the subsequent actions are initiated. Therefore, the location of the library is chosen, and the trigger folder is specified, see figure 15.

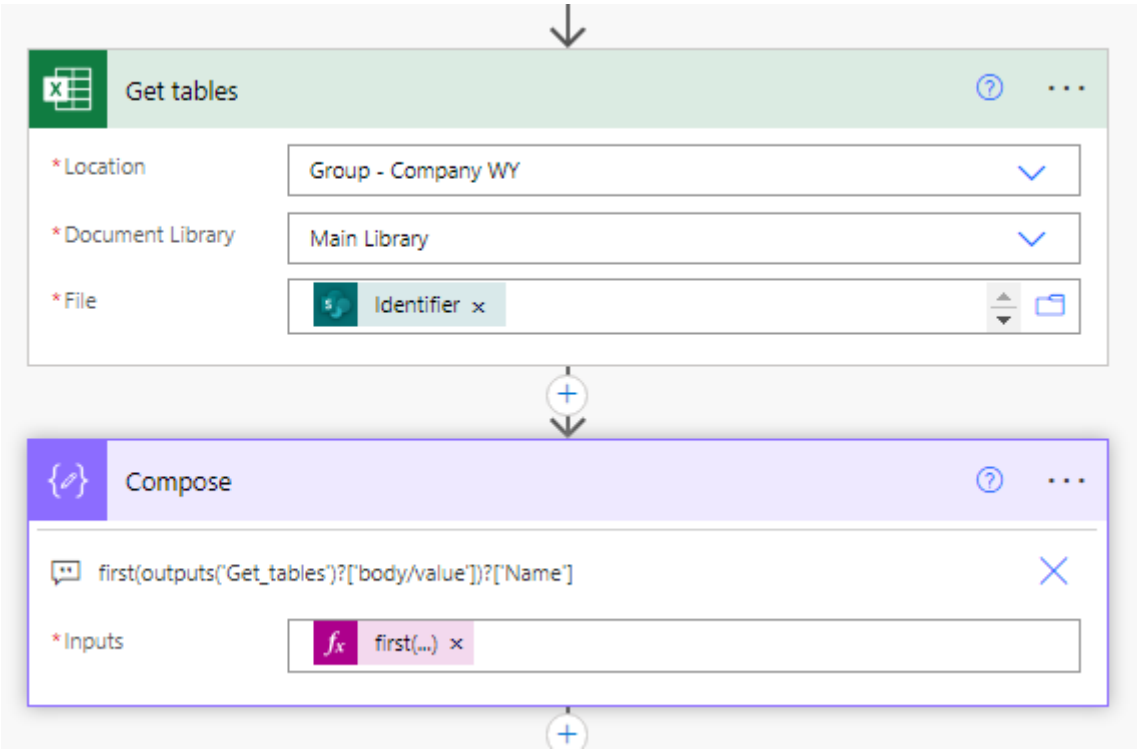

Figure 16. Excel ”Get Tables” action and ”Compose” data operation

In the subsequent step, the "Get file" action within Excel is utilized to retrieve tables from the item. Within this action, the location of the file is specified, and the dynamic file identifier for SharePoint is selected. Next, the "Compose" data operation is created, where an expression is incorporated to retrieve the first item from the response generated by the previous "Get table" action, see figure 16.

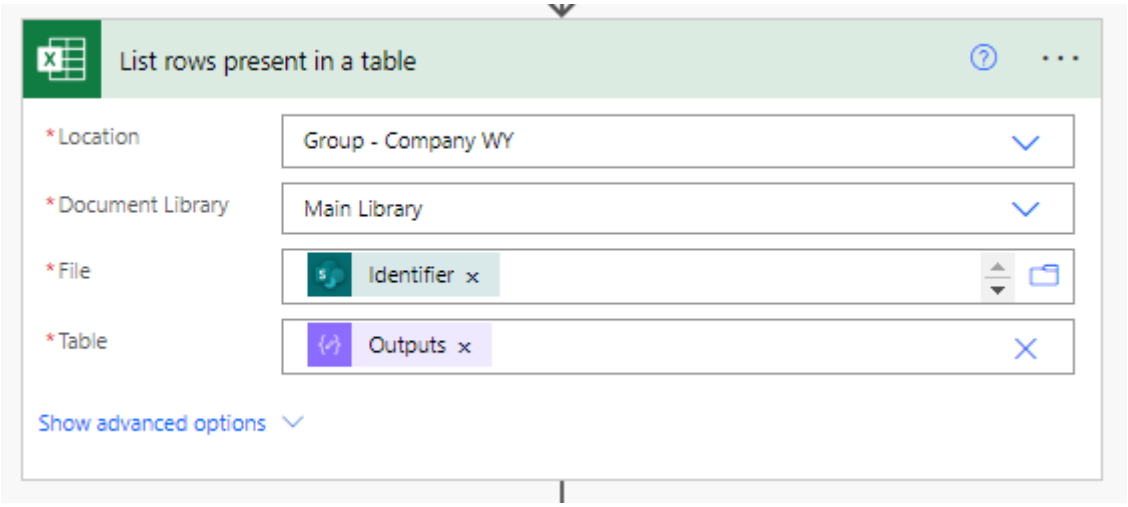

Figure 17. ”List rows present in a table action” created via Excel Business Online

In the subsequent step, the Excel action "List rows present in a table" is used to extract information. Within this action, the location and document library are again defined. The dynamic file identifier is selected and the table section is specified to utilize the previously created "Compose" data operation, see figure 17.

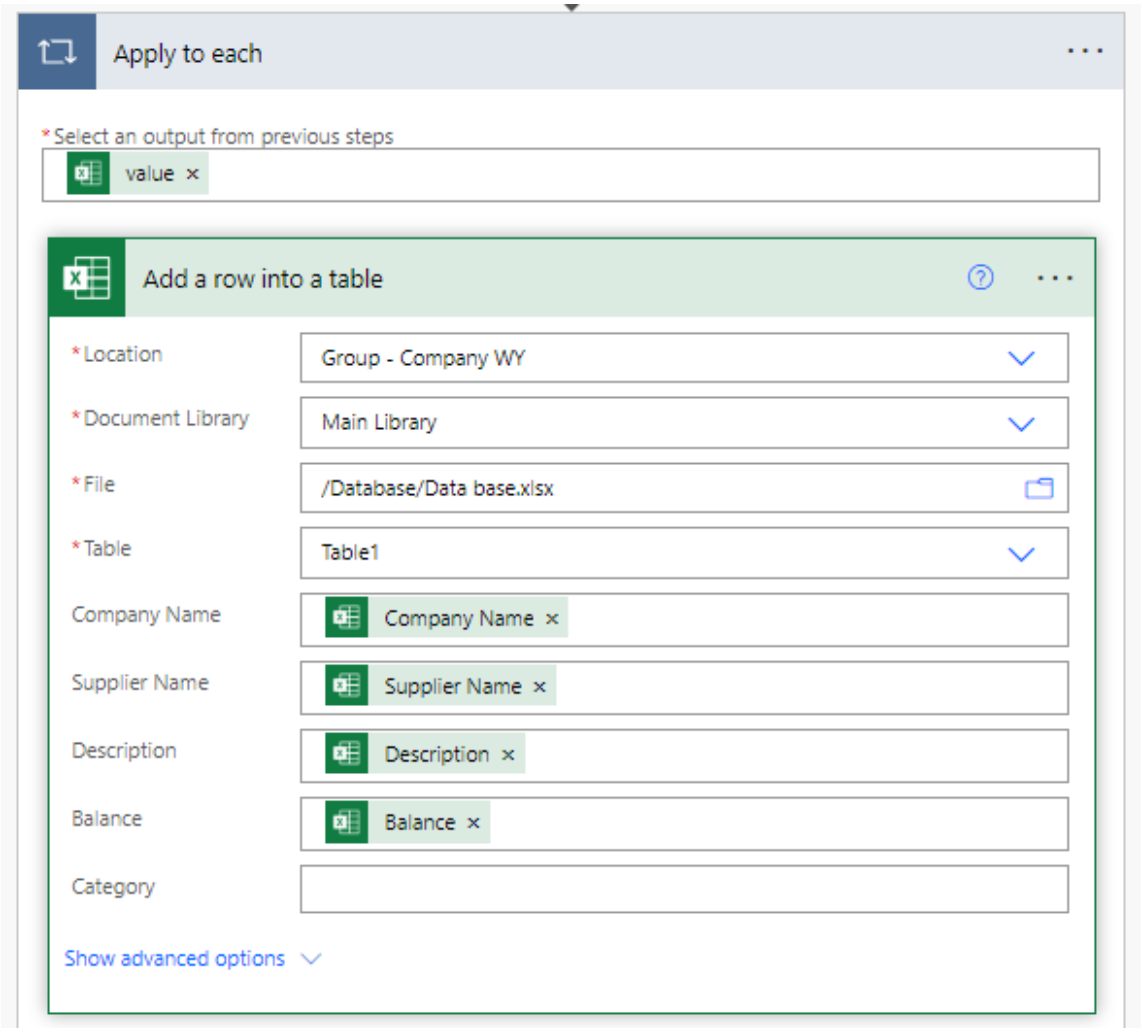

Figure 18. "Add a row into a table" action created via Excel Business Online, included into "Apply to each" control

Lastly, within the "Apply to each" control, the dynamic value is selected and the "Add a row into a table" action in Excel is employed. This action fulfils the final and primary objective of the flow, as it inserts the specific columns from the newly received document into the database. Once again, the location sections are defined within this action. However, unlike the previous steps, the file and table are not dynamic in this case. The exact file and table, corresponding to the database file, must be explicitly specified, see figure 18. After the data is inserted into the main Excel file, an Excel formula is utilized for categorization, which categorizes the data based on specific categories.

7.1.1 Overview of Company W Implementation

The first automated flow involved the utilization of Outlook, Office Scripts, and Power Automate. The development of this automated process followed a straightforward approach, utilizing Office Scripts to record the formatting steps. Subsequently, cloud flows were created, triggered by incoming email with specific naming conventions. Upon activation, the flows execute and save the document to a predefined folder. If the file format is Excel, the script automatically applies the desired formatting to the document. Following the implementation of this solution, a subsequent meeting was conducted with the employee from Company W to showcase the outcomes. While the results achieved partially met the expectations, the employee emphasized that it did not address the primary challenge she was facing. As a result, additional instructions were provided for further implementation.

During the discussion, it was highlighted that the process of formatting and saving files from emails to a designated location accounted for a relatively shorter duration of the overall processing time. The more time-consuming aspect involved evaluating the data and transferring it to the main database. Moreover, when extracting information from incoming sources to the database, only specific portions of the data needed to be transferred. Additionally, once the extracted data is transferred to the database, it has to be categorized according to its intended use.

The implementation of this particular phase of the process posed some challenges as it required finding the optimal approach to ensure that the flow responds to every incoming file and extracts only the necessary data. However, a solution was successfully devised by leveraging the "Compose” data operations within Power Automate cloud flows and incorporating specific expressions to define the desired data extraction criteria.

For the second flow the trigger was set using SharePoint. The flow was triggered when a new file was created within the defined folder. Using the compose function, it enables the function to dynamically extract data from all new excel files incoming to the defined folder.

Irrespective of the naming of the content in the file, the software extracts only specific data. In our case we needed only a specific portion of data: Company Name, Supplier Name, Description, and Balance.

After the specific data is extracted to the database, the excel formula automatically translates the new data to the defined categories in respect of certain wording that data contains in the description.

In summary, the implementation of the processes for Company W involves a complementary relationship between the two flows. The first flow requires additional steps to ensure the execution of the second flow. Moreover, human intervention is necessary to facilitate the correct execution of the flows. Once the first flow is completed, the incoming file is saved and formatted, awaiting human approval. This approval step is essential to verify and correct vendor names, regardless of the formatting. Additionally, the employee specifies the required information to be extracted. The database contains sections for Company, Supplier Name, Description, and Balance, and the corresponding names in the document must be changed accordingly. Furthermore, if the extracted data meets the employee's satisfaction, moving the document to a specific folder triggers the second flow, automatically extracting all the necessary information into the database.

7.2 Company M Process Automation

The implementation process begins by mapping out the desired workflow. This involves outlining the steps and actions that the processes should encompass upon completion. Figure 19 provides a visual representation of the mapped-out flow. As depicted in figure 19, the customer initiates the process by filling out an online form. Next, Power Automate comes into play, creating a List and a dedicated folder for the customer. The customer information is saved in the database, and subsequently, a link is sent to the customer via email. This link enables the customer to upload their documents directly to the designated folder. Upon successful upload, the documents are stored in the folder under the customer's name.

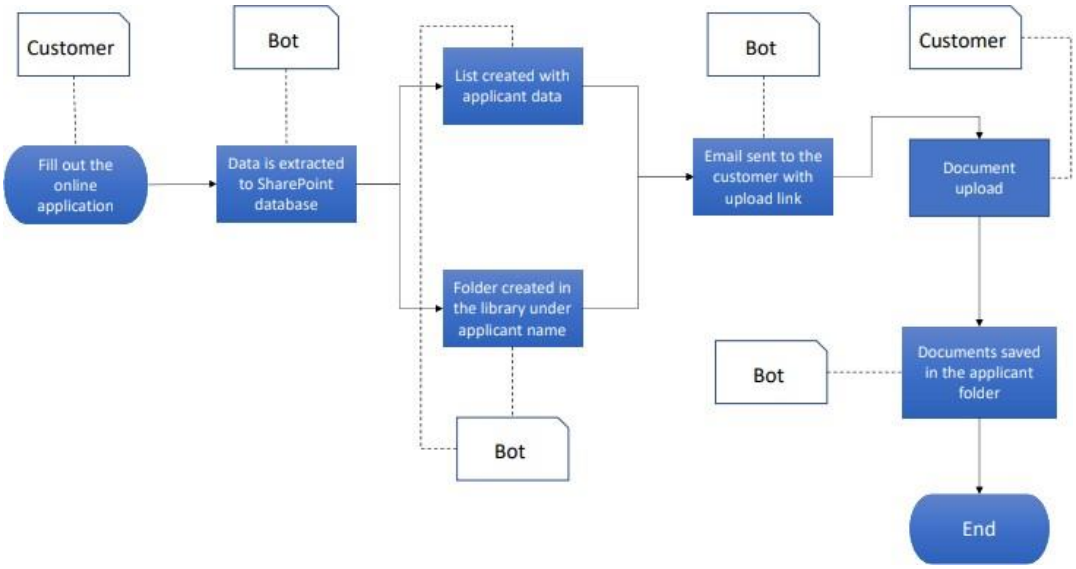

Figure 19. Depiction of process flow of Company M

At the same time, a review of Power Automate blogs is conducted to identify similar processes, the tools utilized, and any relevant suggestions available online. With this knowledge in hand, the process development begins. The following applications are deployed in this process creation: MS Forms for initial data collection, SharePoint for data manipulation, and Outlook for connecting the applicant with the library. In addition, the "compose" data operation plays a vital role in creation of this process, by enabling connection between the processes and simplifying the steps that need to be taken in the flow.

The initial step in starting the creation of the process involves configuring the environment for the flow. A List is created in SharePoint to collect the incoming applicant data and a SharePoint library is also created to store the applicants' documents. Next, an Online Application site is created using MS Forms, as depicted in Figure 20. The application form is used to collect incoming data from the customers. Once the site is ready, the flow creation in Power Automate begins.

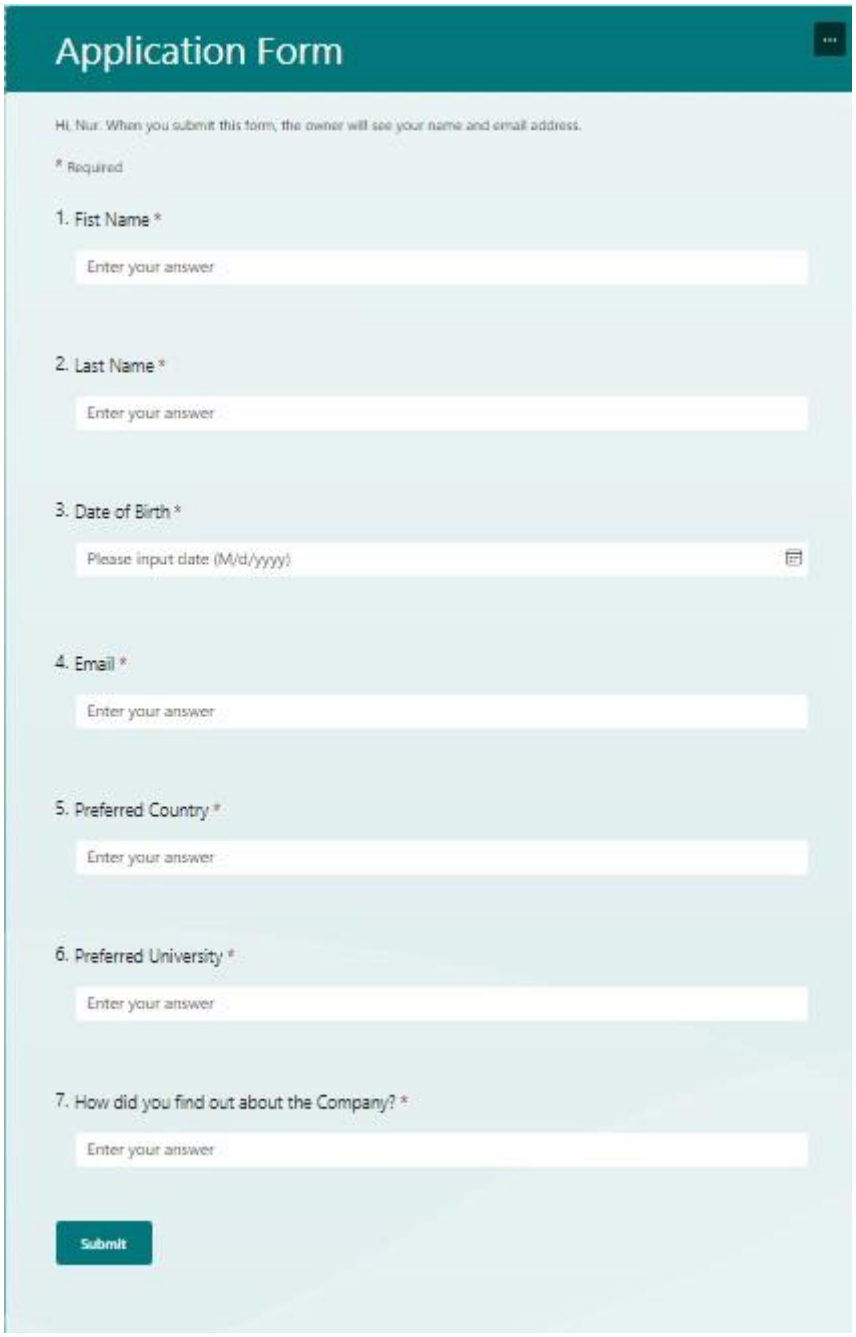

Figure 20. Application Form created via MS Forms

Figure 5 illustrates the initiation of the first and second steps through MS Forms, which are responsible for collecting initial data from the online application submitted by the customer. As the name suggests, the flow is triggered when a new response is submitted via MS Forms. The response is then received based on the dynamic response ID, see figure 21.

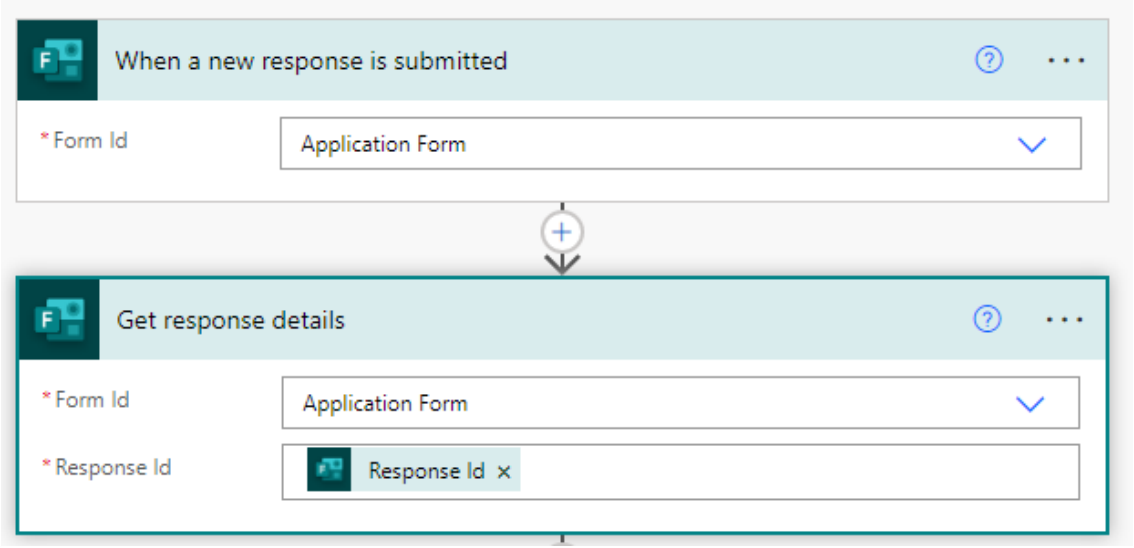

Figure 21: Trigger and ”get response details” action

Next, the "Compose" data operation is utilized to create an expression, as depicted in Figure 22. The "concat" expression is employed to concatenate different strings of text. This created operation is used in the subsequent steps.

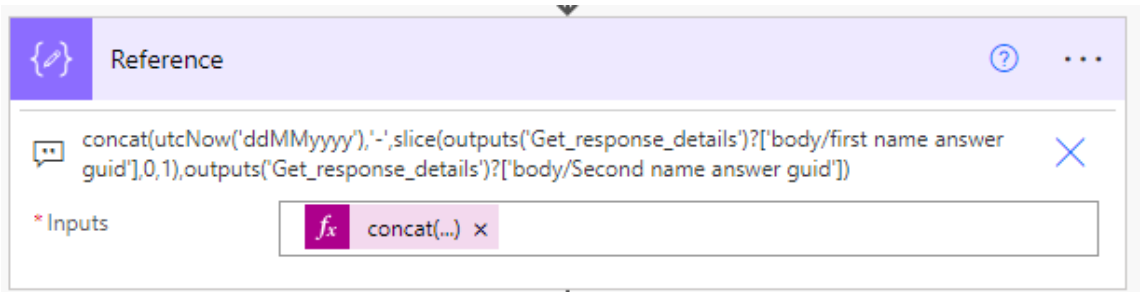

Figure 22. ”Compose” data operation used to link strings together via ”concat” expression

Following that, a SharePoint action is utilized to create a new folder, see figure 23. The site address and List library are provided as inputs, while the folder path is determined by the previously created "compose" expression labelled as "Reference", see figure 22.

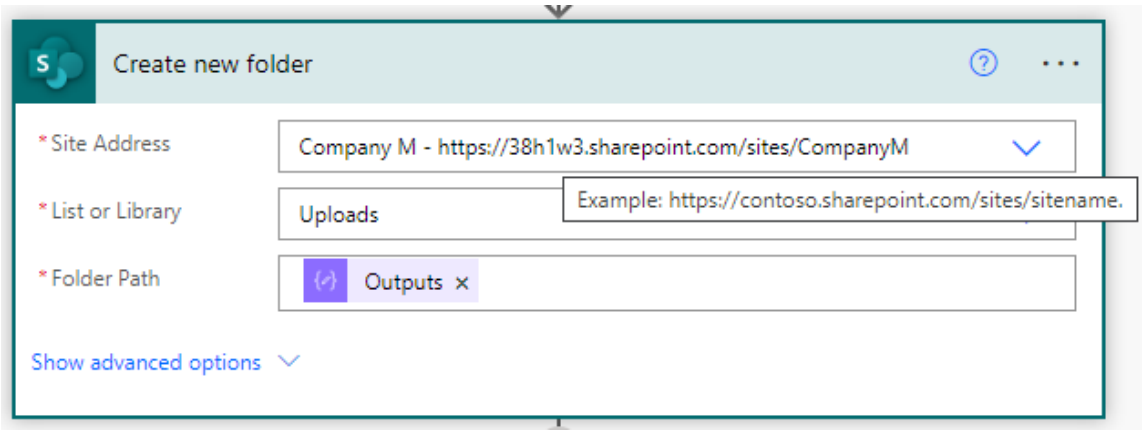

Figure 23. SharePoint ”Create new folder” action

Another "compose" data operation is then created, with the value "Link to Item" extracted from the preceding SharePoint action for folder creation. This particular "compose" data operation allows in subsequent steps to include a link in the SharePoint List, directing to the applicant's folder, see figure 24.

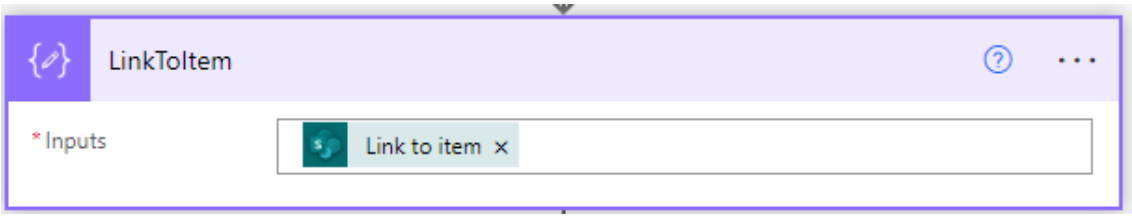

Figure 24. ”Compose” data operation used for creation of dynamic link to item

Moving forward, additional SharePoint actions are employed to create an item in the SharePoint List. The required data is filled out, as illustrated in Figure 25. The site address and List name are specified as the destination for the item creation. Other values are selected from the dynamic content section to ensure their dynamic nature. The "Link to evidence" sections will incorporate the ”compose” data operation labelled as "Link to folder". This provides a column in the SharePoint List with a link which enables direct connection to a specific customer folder.

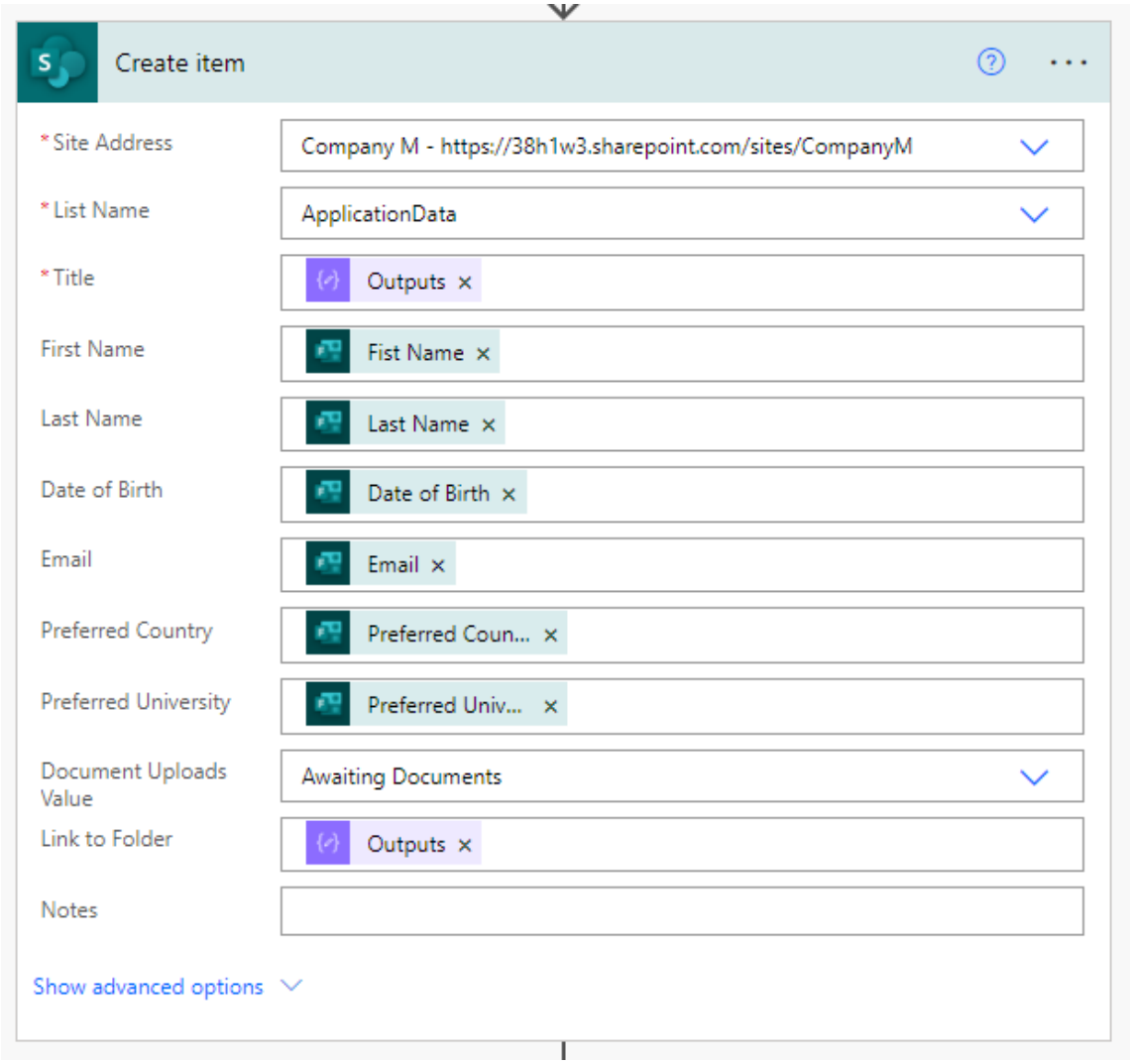

Figure 25. SharePoint ”create item” action

The subsequent step involves a SharePoint action called "Send an HTTP request to SharePoint" is utilized, see figure 26. This particular tool is used to generate a ShareLink that will be shared with the customer, enabling him to submit his documents. Within this action, the site address is inserted, the Post method is selected, and the "uri" is provided, consisting of the library name followed by the dynamic ID of the folder in use.

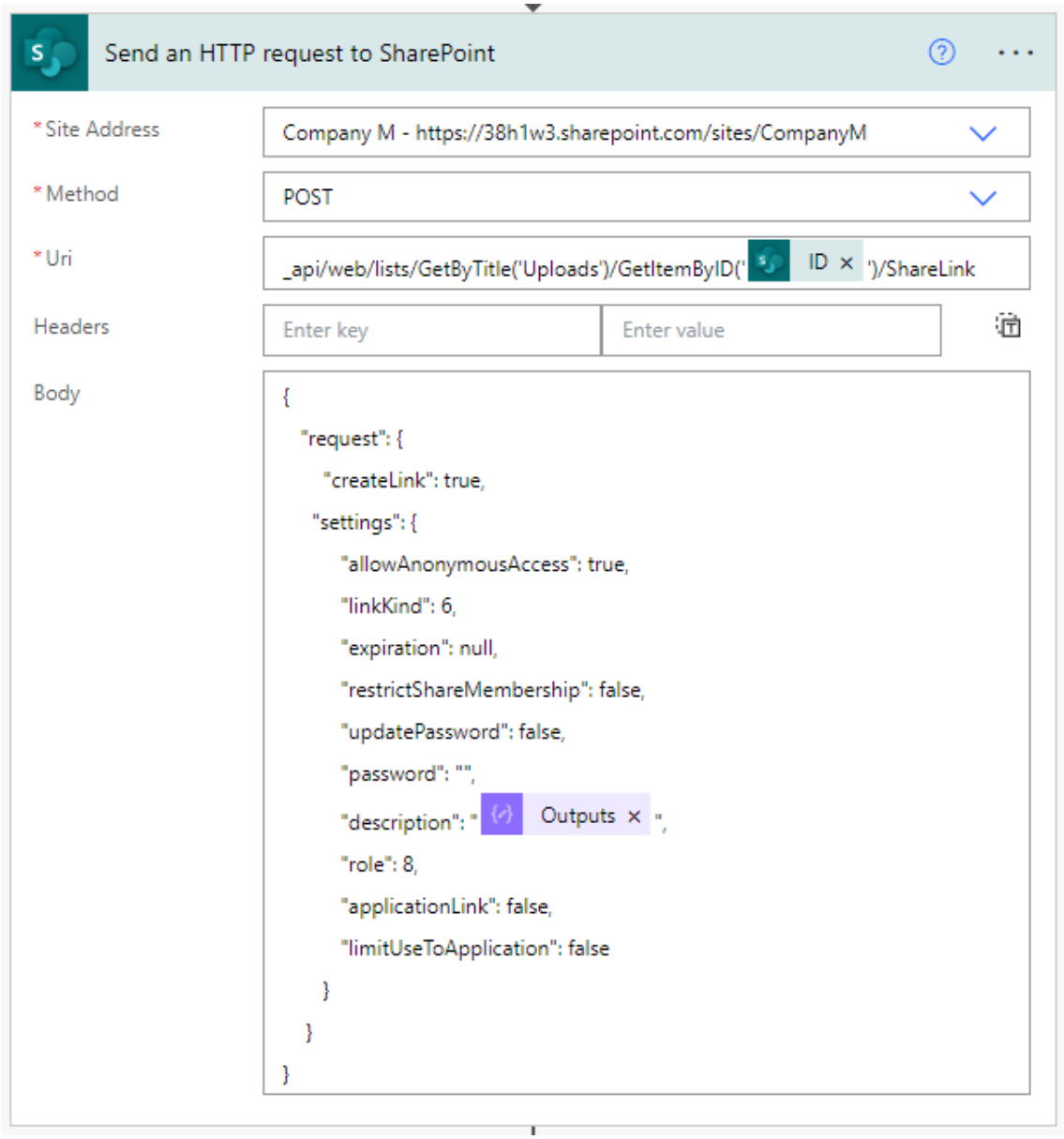

Figure 26. "Send an HTTP request to SharePoint" action

The body of the request must be completed to ensure the execution. Figure 26 provides insight into the underlying code associated with the desired function. To obtain this information, the integrated "Developer tools" within the web browsers was employed. This facilitated the implementation of the code necessary for the SharePoint HTTP request. Furthermore, within the developer tools, specifically in the "Request Payload" section, the body of the intended request was identified.

Additionally, another "Compose" data operation with a dynamic expression is used to retrieve the link from the created HTTP request, see figure 27.

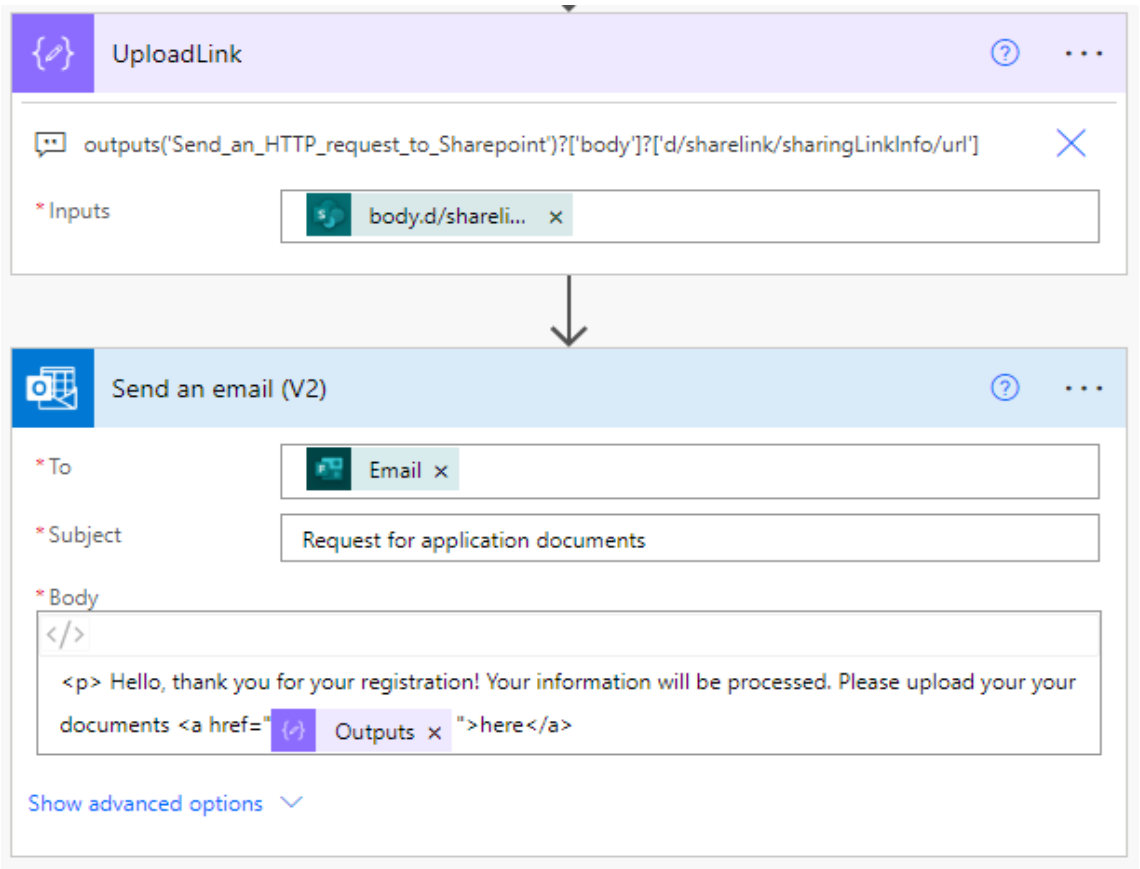

Figure 27. ”Compose” data operation renamed to ”UploadLink” and ”Send an email” action used via Outlook

Finally, an Outlook action is employed to send an email to the customer, containing in the body both the text and the HTTP Link generated through the "compose" data operation. In the recipient section is dynamic email of the applicant is included with desired subject, see figure 27.

8 Summary and evaluation of solutions

This section involves a comparison between the automated processes and their original operation. The objective is to assess the value created by these automated processes and determine whether it is worthwhile to adopt RPA for the company or in the context of this study, evaluate the worth that the software brings to the employees specifically.

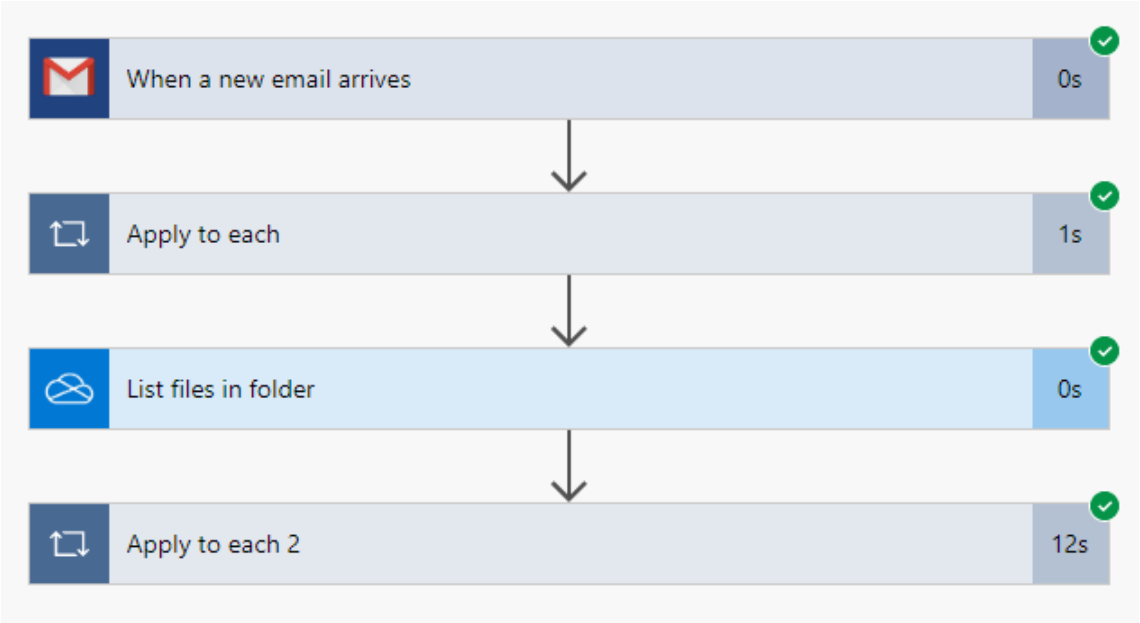

Figure 28. Overview of a complete flow for file formatting

Moreover, a comparison is made in terms of the time saved when the processes operate automatically, and this time saved is converted into potential cost savings. The simulation of the automated processes is conducted, and the findings are presented to the supervisor for validation and credibility of the study.

8.1 Company W

In the case of the first flow, when the same actions are performed manually, the entire process takes approximately 1 minute and 40 seconds to complete, using the same sample files as in the automated flow. However, when the process is initiated using Power Automate, it only takes 12 seconds to complete, see figure 28.

The second flow, if it is executed manually, takes approximately 4 minutes to complete the task. On the other hand, when the task is initiated through Power Automate, it only takes 26 seconds to complete. It is worth noting that human involvement introduces the possibility of errors, whereas the bot can complete the process within seconds and without mistakes.

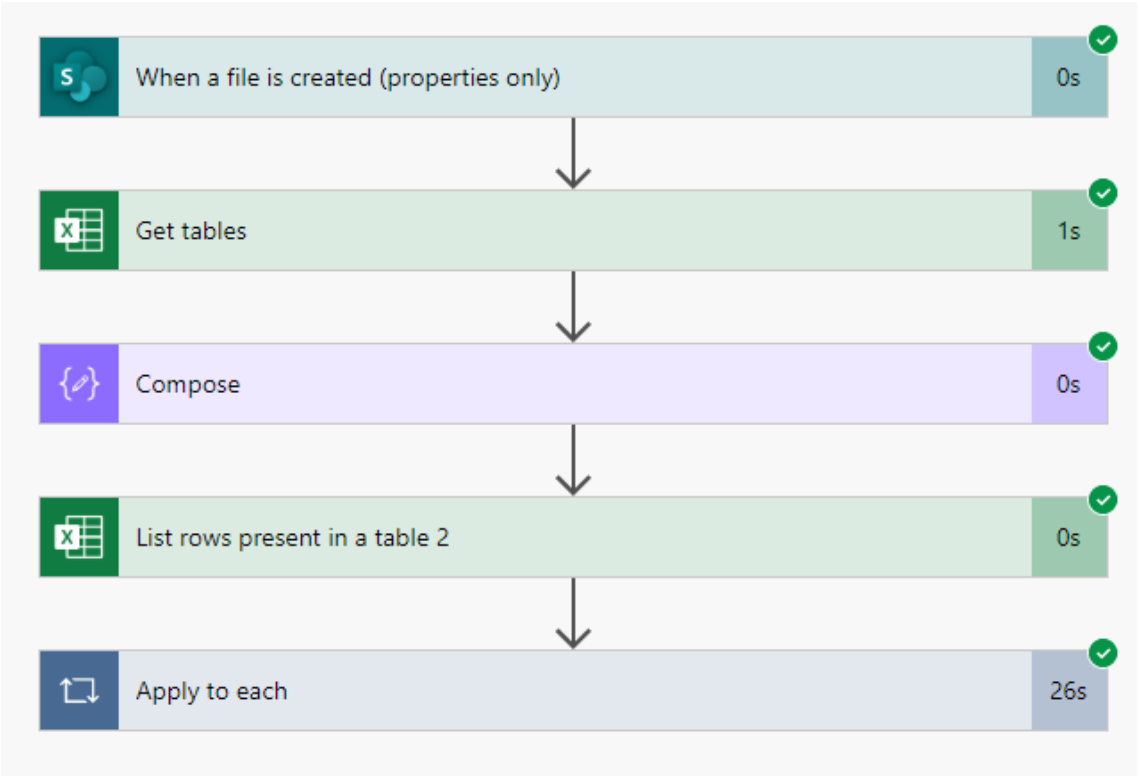

Figure 29. Overview of a complete flow for importing new data to database

In sum, the total time of completing the complete process of Company W, it takes an employee 5 minutes and 40 seconds. Let's assume that the employee deals with 75 such documents per month, and each document takes approximately 5 minutes and 40 seconds to reach the database. This translates to approximately 7 hours per month, which amounts to 105 euro in terms of labour costs, if multiplied by an average of 15 euro per working hour.

These two automated flows for company W serve as examples of tasks that can be effectively automated using bots. Moreover, by combining the numbers together it is evident how much potential the software has. In addition, it is important to note that bots have the capability to handle not only these straightforward processes but far more complex tasks. With that said, RPA capacity to carry out tasks goes beyond the scope of the processes depicted in this study.

8.2 Company M

To evaluate the automated process of Company M, it is essential to return to the company's original process. As indicated during the interview, the original process was identified as inefficient. It involves frequent interruptions and relies heavily on manual operations, particularly in the restructuring of customer data and lengthy documentation procedures. Under the current system, customers are required to physically bring their documents, which are then scanned and organized into specific folders for storage purposes. An alternative method exists, which involves sending the documents via email. However, this approach is not considered efficient due to the additional steps required for employees to download and relocate the files to their respective storage locations. Moreover, a large volume of customer documents sent via email can quickly clutter the inbox, making it difficult to manage and potentially obscuring other important email communications.

In contrast, the implemented solution represents a comprehensive end-to-end process that automates all the aforementioned steps. The customer initiates the process by accessing an application form through the company's website. After completing the form and providing the necessary information, the data is systematically stored in a structured manner within a SharePoint list. Simultaneously, a dedicated folder is generated in the SharePoint library, specifically designated for the respective customer, where all customer folders are centralized.

Upon submitting the application form, the customer receives an email containing a unique link to their personal folder. Through this secure link, the customer can conveniently upload the required documents, which are then stored in the designated folder under their name. It is worth noting that the link's functionality is limited to file uploads and is exclusively linked to the assigned folder for the applicant. This ensures restricted access and prevents unauthorized entry.

Additionally, the application list incorporates an add-in feature that enables employees to update the status of the application, indicating whether all documents have been collected or not. It also allows for the inclusion of notes to facilitate process tracking and facilitate communication among colleagues. Furthermore, the list includes a direct link to the applicant's folder, eliminating the need to search for specific folders within the document library. With a simple click on the link, users are seamlessly directed to the relevant folder, saving significant time and effort.

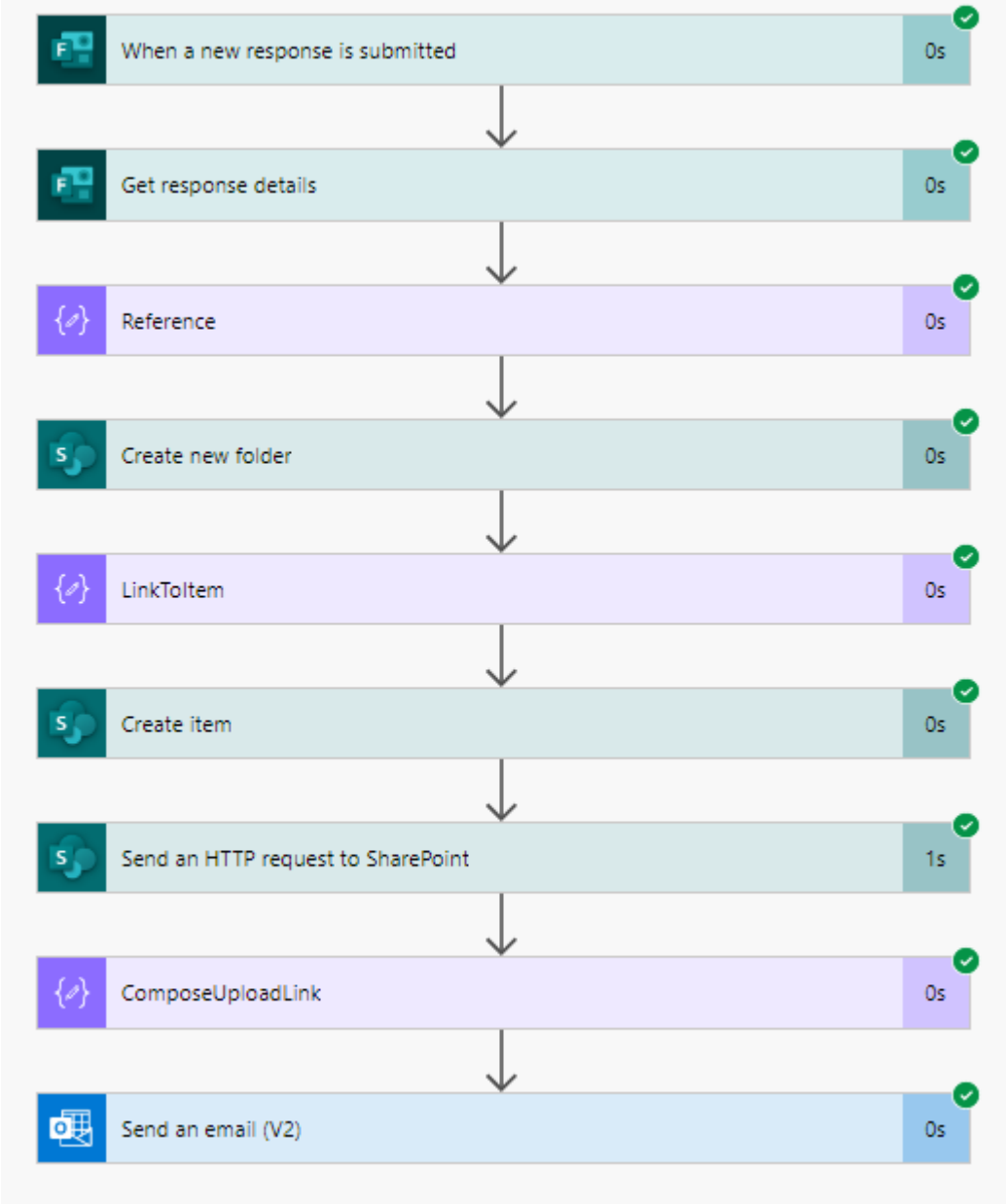

Figure 30. Overview of a complete flow of data manipulation for Company M process

In terms of timing, as illustrated in the diagram, once the customer submits the application, it takes Power Automate 1 second to efficiently organize the data into predefined fields and promptly send an email to the customer, see figure 30. The link provided in the email can be customized to have a designated lifespan, allowing the customer to upload the required documents within a specified timeframe. These documents are then automatically transferred to the customer's designated folder.

9 Conclusion

During this study, both literature and interview findings revealed that modern employees express desire for more engaging tasks in their daily work and a preference for involvement in interactive activities. The abundance of repetitive and mundane tasks contributes to employee dissatisfaction because these tasks occupy a significant portion of their workdays. However, such tasks are necessary for the smooth functioning of the company.

One potential solution to address this issue is task automation. Nevertheless, there are several factors that impede its implementation. This study examined the challenges of high costs, lengthy implementation timeframes and the complexity associated with large-scale RPA deployments. The primary objective of this study was to investigate the feasibility of optimizing individual tasks through RPA.

Cost-efficiency was a crucial element considered in this study. Although the research focused on individual employees, it indirectly influences companies as well, as the efficiency of individual employees contributes to overall organizational performance. Consequently, the research concentrated on small- scale, single-process automation to potentially enhance employees' daily work routines. The research questions addressed were as follows:

"Is Robotic Process Automation effective in optimizing organizational processes?"
"Is it feasible to automate organizational processes at a low cost?"

To answer these questions, comprehensive literature research was conducted to examine the current state of RPA, typical implementations, case study results, and challenges. As the RPA vendor was already selected for this study, an analysis of its pricing offers was performed. In addition, interviews were conducted with employees from various sectors.

The interviews revealed that employees were interested in implementing RPA in their daily processes. However, they were unaware that automation could be achieved on a small scale and even by their own initiative. The perception among employees was that automation required extensive planning by management, leading them to wait for company-wide automation.

Two processes from different companies were identified and simulated for automation. The first automation required human intervention, while the second automation was a complete end-to-end process. It must be mentioned that the author of this study, who possessed no development skills beyond basic proficiency, successfully automated the processes but required considerable time to learn and read blogs on RPA. This highlights the feasibility of developing automated processes by employees within their companies, however it requires a commitment to research and learn about RPA development techniques and capabilities.

Regarding the second research question, "Is it feasible to automate organizational processes at a low cost?", both processes created in this study utilized only Microsoft Office tools. Since most companies already have Office 365 subscriptions, which include Power Automate and other necessary tools, employees are free to practice RPA without additional expenses, assuming proper permissions are granted by the IT administrator. It is crucial to conduct trial runs in a controlled environment to avoid any disruption to the company's existing processes. In the case of companies without the necessary subscriptions, the pricing section revealed that the costs of Power Automate subscriptions are reasonable. For just 15 euros per month, employees can have a Power Automate subscription and begin automating their own processes. By considering the costs involved and the experience gained from this study in developing automated processes with RPA, it can be stated that achieving automation of organizational processes at a low cost is feasible.

In conclusion, this study demonstrates that RPA is effective in optimizing small-scale organizational processes through task automation. It offers flexibility and various approaches to automate diverse tasks. Additionally, the study confirms that automating organizational processes at a low cost is feasible, particularly through the utilization of existing Microsoft Office tools. Hence, by empowering individual employees to explore and implement RPA, organizations can achieve greater efficiency and employee satisfaction while minimizing costs.

10 Limitations

Due to unforeseen restraints, the number of employees interviewed for this study was smaller than originally planned. As a result, it is important to acknowledge that the empirical data collected may not be directly applicable to every company. Furthermore, due to the limited number of simulations conducted, only a few specific types of processes were explored for automation. Consequently, the results obtained may not be universally applicable to all types of processes.

Another limitation is the exclusion of Power Automate Desktop from implementation phase . While it is a part of the RPA domain and utilizes different technologies for process automation, its absence in the development of processes is recognized as a constraint.

11 Self-reflection

From the beginning to the end of this thesis, I have experienced a tremendous amount of learning. Before starting the thesis, I believed that I had some knowledge about RPA. However, as I conducted the research, I came to the realization that my understanding of the subject was rather on the surface level, parallel to knowing the external appearance of a box without truly comprehending its contents. The research process enabled me to gain extensive knowledge on the topic, surpassing my initial expectations.

Regarding the practical aspect, I initially had uncertainties about how to proceed. However, I embraced the excitement of facing new challenges and hoped to enhance my existing RPA skills. Despite encountering difficulties during the implementation phase, I persevered and managed to find solutions to make it work. As a result, my confidence in my RPA skills has significantly increased, and I am certain that they will be valuable in my professional career. I am delighted that I chose this research direction, which allowed me to experiment with process implementations. This decision has proven to be rewarding, offering me invaluable opportunities for growth and development.

References

van der Aalst. W. (2012) ‘Process Mining Manifesto’, in F. Daniel, K. Barkaoui, and S. Dustdar (eds) *Business Process Management Workshops*. Berlin, Heidelberg: Springer (Lecture Notes in Business Information Processing), pp. 169–194. DOI:10.1007/978-3-642- 28108-2_19.

van der Aalst, W., Bichler, M. and Heinzl, A. (2018) ‘Robotic Process Automation’, *Business & Information Systems Engineering*, 60(4), pp. 269–272. DOI: 10.1007/s12599-018-0542-4.

Bygstad, B. (2017) ‘Generative Innovation: A Comparison of Lightweight and Heavyweight IT’, *Journal of Information Technology*, pp. 180–193. DOI:10.1057/jit.2016.15.

Choi, D., R’bigui, H. and Cho, C. (2021) ‘Robotic Process Automation Implementation Challenges’, in P.K. Pattnaik et al. (eds) *Proceedings of International Conference on Smart Computing and Cyber Security*. Singapore: Springer (Lecture Notes in Networks and Systems), pp. 297–304. DOI: 10.1007/978-981-15-7990-5_29

Deloitte (2016) *Next generation automation: Transform your business process with robotic and intelligent automation*. Switzerland, pp. 1–12. Available at: https://www2.deloitte.com/ch/en/pages/technology/solutions/next-generation-automation.html (Accessed: 29 May 2023).

Drucker, P.F. (1992) *The Age of Discontinuity: Guidelines to Our Changing Society*. Transaction Publishers. Available at: https://books.google.fi/books?id=1Zp7_rJ1vcMC&q=knowledge+workers&redir_esc=y#v=snippet&q=knowledge%20workers&f=false.

Dumas, M., La Rosa, M., Mendling, J. and Reijers H.A. (2018) *Fundamentals of Business Process Management*. 2nd edn. Berlin, Heidelberg: Springer. Availableat: https://dl.uswr.ac.ir/bitstream/Hannan/141382/2/9783662565087.pdf (Accessed: 17 April 2023).

Dutta, D., Gillard, A. and Kaczmarskyj, G. (2016) ‘Why planning makes the difference between success and disappointment’, *Ernst & Young LLP (UK)*, pp. 1–12.

Eskelinen, P.R. (2019) *Potential automation of operative work in a case company*. Metropolia University of Applied Sciences. Available at: http://www.theseus.fi/handle/10024/505089 (Accessed: 8 February 2023).

Fersht, P. and Slaby, J.R. (2012) 'Robotic automation emerges as a threat to traditional low-cost outsourcing', *The Knowledge Community for Global Business and IT Services*, pp. 1–19. Available at: https://www.horsesforsources.com/wp-content/uploads/2016/06/RS-1210_Robotic-automation-emerges-as-a-threat-060516.pdf.

Flechsig, C., Anslinger, F. and Lasch, R. (2022) 'Robotic Process Automation in purchasing and supply management: A multiple case study on potentials, barriers, and implementation', *Journal of Purchasing and Supply Management*, 28(1), pp. 1–21. DOI: 10.1016/j.pursup.2021.100718.

Geyer-Klingeberg, J., Nakladal, J.*, Baldauf F. and Veit, F.* (2018) 'Process Mining and Robotic Process Automation: A Perfect Match', in. *Paper presented at 16th International Conference on Business Process Management 2018, Industry Track Session, Sydney, Australia*, pp. 1–8.

Herm, L.V., Janiesch, C., Helm, A., Imgrund, F., Hofmann, A. and Winkelman, A. (2022) 'A framework for implementing robotic process automation projects', *Information Systems and e-Business Management*, pp. 1– 35. DOI: 10.1007/s10257-022-00553-8.

Hofmann, P., Samp, C. and Urbach, N. (2020) 'Robotic Process Automation', *Electronic Markets*, 30, pp. 100–106. DOI: 10.1007/s12525-019-00365-8.

Imgrund, F., Fischer, M., Janiesch, C. and Winkelmann, A. (2017) 'Managing the Long Tail of Business Processes', in *In Proceedings of the 25th European Conference on Information Systems (ECIS), Guimaraes, Portugal*, pp. 595–610. Available at: https://www.researchgate.net/publication/317902114_Managing_the_Long_Tail_of_Business_Processes.

Jaervinen, A. (2021) *Implementation of robotic process automation - Case Company X Oy*. Hame University of Applied Sciences. Available at: http://www.theseus.fi/handle/10024/502261 (Accessed: 8 February 2023).

Jimenez Ramirez, A. (2021) 'Humans, Processes and Robots: A Journey to Hyperautomation', in, pp. 3–6. DOI: 10.1007/978-3-030- 85867-4_1.

Lacity, M. and Willcocks, L. (2015) 'What Knowledge Workers Stand to Gain from Automation', *Harvard Business Review The Future of Operations*, pp. 1–6.

Lacity, M., Willcocks, L. and Andrew, C. (2015) 'Paper 15/02 Robotic Process Automation at Telefónica O2', *The London School of Economics and Political Science*, Paper 15/02, pp. 1–19.

Melchert, F., Winter, R. and Klesse, M. (2004) 'Aligning Process Automation and Business Intelligence to Support Corporate Performance Management', in

Proceedings of the Tenth Americas Conference on Information Systems, New York, New York, August 2004, pp. 4053–4061. Available at: https://www.researchgate.net/publication/44938556_Aligning_Process_Automation_and_Business_Intelligence_to_Support_Corporate_Performance_Management.

Mercurio, R. and Merrill, B. (2021) 'Power Automate', in R. Mercurio and B. Merrill (eds) *Beginning Microsoft 365 Collaboration Apps: Working in the Microsoft Cloud*. Berkeley, CA: Apress, pp. 287–320. DOI: 10.1007/978-1-4842-6936-7_11.

van der Meulen, R. (2020) *Trends from Gartner Hype Cycle for Legal and Compliance Technologies 2020*. Available at: https://www.gartner.com/smarterwithgartner/4-key-trends-in-the-gartner-hype-cycle-for-legal-and-compliance-technologies-2020 (Accessed: 19 April 2023).

MS Power Automate (2021) 'Is Power Automate Free? 8 Things You Need to Know', 7 April. Available at: https://mspowerautomate.com/is-power-automate-free-microsoft-power-automate-licensing/ (Accessed: 2 June 2023).

Pearson, M., Knight, B., Knight, D., Quintana, M. and Pearson, Mitchell. (2020) 'Introduction to Power Automate', in M. Pearson et al. (eds) *Pro Microsoft Power Platform: Solution Building for the Citizen Developer*. Berkeley, CA: Apress, pp. 73–78. DOI: 10.1007/978-1- 4842-6008-1_9.

Protiviti (2019) *Taking RPA to the Next Level - How companies are using robotic process automation to beat the competition*. Survey, pp. 1–48. Available at: https://econsultsolutions.com/wp-content/uploads/2019/05/2019-global-rpa-survey-protiviti.pdf.

Santos, F., Pereira, R. and Vasconcelos, J.B. (2020) 'Toward robotic process automation implementation: an end-to-end perspective', *Business Process Management Journal*, 26(2), pp. 405–420. DOI: 10.1108/BPMJ-12-2018-0380.

Schmitz, M., Dietze, C. and Czarnecki, C. (2019) 'Enabling Digital Transformation Through Robotic Process Automation at Deutsche Telekom', in N. Urbach and M. Roeglinger (eds) *Digitalization Cases: How Organizations Rethink Their Business for the Digital Age*. Cham: Springer International Publishing (Management for Professionals), pp. 15–33. DOI: 10.1007/978-3-319-95273-4_2.

Taulli, T. (2020) *The Robotic Process Automation Handbook: A Guide to Implementing RPA Systems*. Berkeley, CA: Apress. DOI: 10.1007/978-1-4842-5729-6.

Wanner, J., Fischer, M., Janiesch C., Hofmann, A., Imgrund, F. And Geyer-Klingeberg, J. (2019) 'Process Selection in RPA Projects – Towards a Quantifiable Method of Decision Making', in. *Fortieth International Conference on Information Systems*, Munich, pp. 1–17.

Willcocks, L., Lacity, M. and Craig, A. (2015) ‘Paper 15/03 Robotic Process Automation at Xchanging’, *The London School of Economics and Political Science*, pp. 1–26.

Willcocks, L., Lacity, M. and Craig, A. (2016) ‘Paper 15/06 Robotic Process Automation’, *Mature Capabilities in the Energie Sector*, pp. 1–19.

Willcocks, L., Lacity, M. and Craig, A. (2015) ‘Paper 16/01 Robotic Process Automation’, *Next Transformation Lever for Shared Services*, pp. 1–35.

Yoshida, T. and Osborne, K. (2022a) *Attended and unattended scenarios for process automation - Power Automate*, *Miscrosoft*. Available at: https://learn.microsoft.com/en-us/power-automate/guidance/planning/attended-unattended (Accessed: 3 June 2023).

Yoshida, T. and Osborne, K. (2022b) *Flowchart to help you decide how to design your automation in Power Automate - Power Automate*, *Miscrosoft*. Available at: https://learn.microsoft.com/en-us/power-automate/guidance/planning/decision-making-flow (Accessed: 3 June 2023).