Olivia Luttinen

CRITICAL SUCCESS FACTORS IN ROBOTIC PROCESS AUTOMATION IMPLEMENTATION PROJECTS

UNIVERSITY OF JYVÄSKYLÄ
FACULTY OF INFORMATION TECHNOLOGY
2022

ABSTRACT

Luttinen, Olivia
Critical Success Factors in Robotic Process Automation Implementation Projects
Jyväskylä: University of Jyväskylä, 2022, 61 pp.
Information Systems, Master's Thesis
Supervisor: Pulkkinen, Mirja

Robotic Process Automation (RPA) is a Business Process automation technology that automates processes that are repetitive, routine-like and require low level of cognitive abilities. The implementation of RPA is considered efficient and accessible and it enables organizations to have faster, more productive and error-free processes. The purpose of this master's thesis was to study Critical Success Factors (CSFs) in RPA implementation projects in large organizations. The research aimed to expand the existing knowledge about Robotic Process Automation, its implementation and the factors that lead to a successful implementation. The research consisted of two parts: the theoretical part and the empirical part. The empirical part of the research was conducted as a qualitative case study and the case organization is a large globally operating water technology company. The theoretical part built an understanding of RPA implementation projects and their Critical Success Factors based on the literature review conducted. The empirical part sought to strengthen and expand understanding in the previous research of Critical Success Factors in RPA implementation projects from the perspective of a large organization. Based on the results of the research, six Critical Success Factors were identified: project management, involving right people, prioritizing the project, communication, process optimization and maturity and project team engagement. The results of the research support previous research on Robotic Process Automation implementation projects and supplement research information on the Critical Success Factors in Robotic Process Automation implementation projects. The results of the research can be utilized as a guide in the Robotic Process Automation implementation projects for large organizations.

Keywords: Critical Success Factors, CSFs, Robotic Process Automation, RPA, RPA implementation

TIIVISTELMÄ

Luttinen, Olivia
Critical Success Factors in Robotic Process Automation Implementation Projects
Jyväskylä: Jyväskylän yliopisto, 2022, 61 s.
Tietojärjestelmätiede, pro gradu -tutkielma
Ohjaaja: Pulkkinen, Mirja

Ohjelmistorobotiikka (RPA) on liiketoimintaprosessien automaatioteknologia, joka automatisoi toistuvia, rutiininomaisia ja matalia kognitiivisia kykyjä vaativia prosesseja. RPA:n käyttöönottoa pidetään tehokkaana ja sujuvana, ja se mahdollistaa organisaatioille nopeammat, tuottavammat ja virhevapaammat prosessit. Tämän pro gradu -tutkielman tarkoituksena oli tutkia kriittisiä menestystekijöitä (CSFs) RPA:n implementointiprojekteissa suurissa organisaatioissa. Tutkimuksen tavoitteena oli laajentaa olemassa olevaa tietämystä ohjelmistorobotiikasta, sen implementoinnista ja onnistuneeseen implementointiin johtavista tekijöistä. Tutkimus koostui kahdesta osiosta: teoreettisesta ja empiirisestä osiosta. Tutkimuksen empiirinen osio toteutettiin kvalitatiivisena tapaustutkimuksena ja tapausorganisaatio on suuri globaalisti toimiva vesiteknologiayritys. Teoreettisessa osiossa rakennettiin käsitys RPA:n implementointiprojekteista ja niiden kriittisistä menestystekijöistä toteutetun kirjallisuuskatsauksen perusteella. Empiirisessä osiossa pyrittiin vahvistamaan ja laajentamaan aiemman tutkimuksen ymmärrystä kriittisistä menestystekijöistä RPA:n implementointiprojekteissa suuren organisaation näkökulmasta. Tutkimuksen tulosten perusteella tunnistettiin kuusi kriittistä menestystekijää: projektinhallinta, oikeiden henkilöiden osallistaminen, projektin priorisointi, kommunikaatio, prosessien optimointi ja kypsyys, sekä projektitiimin sitouttaminen. Tutkimuksen tulokset tukevat aiempaa tutkimusta ohjelmistorobotiikan implementointiprojekteista ja täydentävät tutkimustietoa ohjelmistorobotiikan implementointiprojektien kriittisistä menestystekijöistä. Tutkimuksen tuloksia voidaan hyödyntää suurten organisaatioiden sisäisessä ohjeistuksessa ohjelmistorobotiikan implementointiprojekteissa.

Asiasanat: CSFs, Kriittiset menestystekijät, Ohjelmistorobotiikka, RPA, RPA:n implementointi

FIGURES

TABLES

TABLE OF CONTENTS

1 INTRODUCTION

Digitalization has brought Information Technology (IT) into everyday life and at the same time the business environment is constantly changing, as are the demands of consumers. Consumerization in IT has created a new wave of need for better usability in technology, and alongside consumers, organizations also demand easy-to-use technology solutions, making them accessible to everyone. In addition to usability, efficiency and cost are important drivers in the choice of new IT solutions. Robotics, and especially Robotic Process Automation (RPA), has enabled a cost-effective and easy-to-integrate solution for organizations.

RPA is a Business Process automation technology (Madakam, Holmukhe & Jaiswal, 2019) which can be utilized for automation of tasks normally performed by humans (Asatiani & Penttinen, 2016; Fung, 2014; Geyer-Klingeberg, Nakladal, Baldauf & Veit, 2018; Lacity, Willcocks & Craig, 2015; Slaby, 2012). From the point of view of organizations, there are several advantages achieved by utilizing Robotic Process Automation, such as time saving (Lacity & Willcocks, 2015, 2017; Slaby, 2012; Suri et al., 2017; Vishnu et al., 2017), high scalability (Lacity and Willcocks, 2015, 2017; Slaby, 2012; Suri et al., 2017; Vishnu et al., 2017) and cost savings (Lacity & Willcocks, 2017; Suri et al., 2017). Madakam, Holmukhe and Jaiswal (2019) suggest that RPA is becoming a compelling tool in order to operate business in global organizations. The increased importance of RPA can be seen with significantly increased volumes of conducted searches and papers regarding RPA, starting from the end of 2016 (Santos, Pereira & Vasconcelos, 2020). Later, the year 2018 has been called as the year of Robotic Process Automation (Madakam, Holmukhe & Jaiswal, 2019), when RPA began to establish itself as a means of Business Process automation.

The above benefits are achieved through the successful implementation of RPA, which is influenced by, for example, the suitability of the process (Lacity, Willcocks & Craig, 2015), the need for process improvement (Alberth & Mattern, 2017), and the justification of the need for all stakeholders (Wright et al., 2018). The project success of Information Technology projects has traditionally been defined as a project that meets set goals in terms of time, quality, risks and cost (Guo, 2019; Rodriguez-Repiso et al., 2020), but research has found the definition to be narrow. Key factors that are considered essential in enabling the success are defined as Critical Success Factors (CSFs) (Bullen & Rockart, 1981). Critical Success Factors have not yet been extensively studied in the context of Robotic Process Automation and e.g. Syed et al. (2020) suggest that empirical studies of CSFs in RPA projects should be conducted.

The topic of the research is Critical Success Factors in Robotic Process Automation implementation projects from the perspective of large-scale organizations. The research is conducted as a qualitative case study and the assigning organization is a large globally operating water technology company, where Robotic Process Automation has been implemented in the invoicing process from 2018 onwards. The aim is to create an understanding that will allow for better success in future implementations of Robotic Process Automation.

The research seeks to answer the following research question:

- *What are the Critical Success Factors in Robotic Process Automation implementation projects in large-scale organizations?*

The research is divided into two main parts: a theoretical foundation and an empirical part. The first part, in chapter 2, builds a theoretical understanding of Robotic Process Automation and its implementation, as well as the related challenges and opportunities associated with it. Critical Success Factors are generally discussed in the context of software projects, and more specifically in the context of RPA projects. The second part, in chapter 3, presents the empirical part of the research. The case organization, the method used, data collection and data analysis are described. The results of the empirical research are then presented in chapter 4, followed with discussion in chapter 5 and finally conclusion of this research in chapter 6.

2 LITERATURE REVIEW

This section presents the theoretical part of the research. First, the topic of this research is introduced through Business Process Management and the elements of Business Process. The Business Process relevant to the case, i.e. Sales Invoice Process, is presented as an example of a Business Process. Business Process automation and specifically Robotic Process Automation is discussed in the second chapter, following with the discussion of the Critical Success Factors in Robotic Process Automation implementation projects in the third chapter.

The theoretical part was built on the basis of a literature review. The following search terms were used to search scientific literature from Google Scholar: "Business Process", "Business Process automation", "Business Process Management", "Critical Success Factors", "Invoicing Process", "Process analysis", "Process Automation", "Robotic Process Automation", "RPA", "RPA adoption", "RPA implementation", "RPA project", "RPA Success" and combinations of the terminology. Also reference material from the found literature was used in conducting the literature review. The literature chosen for this research, was selected on the basis of its suitability for the research, favoring the most cited and published in scientific publications. Where selected literature focusing on Robotic Process Automation has been published between 2014 and 2022, literature focusing on Critical Success Factors has been published between 1981 and 2022. According to the literature review conducted, a significant rise in the amount of RPA related research made has occurred starting from 2017. The selected literature covers both qualitative and quantitative research, with a focus on qualitative research. The search for the literature has been carried out between September 2021 and July 2022.

2.1 Business Process Management

Today, many organizations view their business in a process-oriented manner (Zairi, 1997). Organizations' business revolves around processes and different functions, such as service delivery or product design, are processes. There is always an input and an output in the process (Zairi, 1997) and Aguilar-Savén (2004) defines Business Process (BP) as "the combination of a set of activities within an enterprise with a structure describing their logical order and dependence whose objective is to produce a desired result" (Aguilar-Savén, 2004). Existing research on Business Process covers wide areas and silos and as a term, it has existed for a long time, dating back to the early 20th century. However, in its current form, the term did not become established until the 1980s (Sidorova & Isik, 2010).

Business Process Management (BPM) is a method for improving the means to manage the organizational business processes alongside with the overall mindset of employees (Rosemann & von Brocke, 2015) by combining Information Technology and management practices (Van der Aalst, 2013). BPM focuses on continual improvement with core business elements. It helps organizations achieve their goals by utilizing all resources persistently. (Zairi, 1997.) Business Process Management is about re-engineering Business Processes and creating value (Hammer, 2015) while following an iterative lifecycle (Dumas, La Rosa, Mendling & Reijers 2018). Dumas et al. (2018) define the six steps of the lifecycle of Business Process Management as process identification, process discovery, process analysis, process redesign, process implementation and process monitoring. All of these steps consist of activities that help to identify the Business Process, its elements, improvement and continuous monitoring (Dumas et al., 2018).

2.1.1 Elements of Business Processes

In order to go through the steps in BPM lifecycle, knowledge of Business Process and its elements together with Business Process modeling, is needed. As Aguilar-Savén (2004) stated, Business Processes consists of activities. Dumas et al. (2018) expand this view with events and decision points, which include a set of actors, physical objects and informational objects. All the different elements of BPs are interconnected and measurable (Sharp & McDermott, 2009).

Measurability enables the evaluation and analysis of Business Processes on a wider level. Comprehensive modeling of Business Processes serves as a tool during the lifecycle of Business Process Management (Dumas et al., 2018). Business Processes can be modeled at different levels: in detail by defining all elements and the connections between them, or at the other extreme by focusing only on the main elements of the process (Sharp & McDermott, 2009). Dumas et al. (2018) argue that over the lifecycle it is not productive to focus on performing individual activities, but the purpose is to manage chains of events.

In the following chapter, a sales invoice process is presented and modeled as an example of a Business Process. The sales invoice process is modeled based on the process of the case organization, focusing on the different steps of the process, i.e. main processes, sub-processes and connections between them, excluding finer details such as actors.

2.1.2 Example of Sales Invoice Process

Financial management plays a significant role in the continuity and profitability of the business, and the improvement of financial Business Processes inside organization has become an important part of efficient business in recent decades. Financial management functions are typically accomplished by humans and Information Systems (Kaarlejärvi & Salminen, 2018), but the electronification and digitalization of financial management in recent decades has increased the role of technology in performing functions (Salminen & Lahti, 2014). The development of financial management in the 2020s is seen to have shifted a phase of intelligent financial management, where automation is utilized in financial management functions. For example, by utilizing Artificial Intelligence (AI) and Robotic Process Automation possibilities for automating financial management functions are much wider than before (Kaarlejärvi & Salminen, 2018).

Financial management is used for monitoring and reporting financial events of organizations, including both internal and external accounting (Salminen & Lahti, 2014). As a whole, financial management can be considered to consist of data, processes and reporting. More specifically, financial management processes can be divided into purchase invoice process, sales invoice process, travel invoice process, expense invoice process, payment transactions, cash management, fixed asset accounting and payroll accounting. (Kaarlejärvi & Salminen, 2018.)

The sales invoice process can be divided into four phases: preparing the invoice, sending the invoice, archiving the invoice and lastly, the ledger entries (Lahti & Salminen, 2014). In the case organization, the sales invoice process is divided into two subprocesses: delivery control and invoicing. In the delivery control process, all open order lines are reviewed daily, and the lines delivered to the customer are marked as ready for invoicing. In the invoicing process, the sales orders that contain ready-to-invoice order lines are invoiced. Invoices are printed, checked and closed. Invoices are then sent to customers, archived and entered to the ledger. Both the delivery control and invoicing process in this case correspond to the invoice preparation phase by Lahti and Salminen (2014). In the Robotic Process Automation implementation project in the case organization, the delivery control and invoicing processes were the subject of automation. This research refers to the sales invoice process to the extent that it is automated through Robotic Process Automation in the case organization. The process flow to be automated is modeled in the figure below (Figure 1).

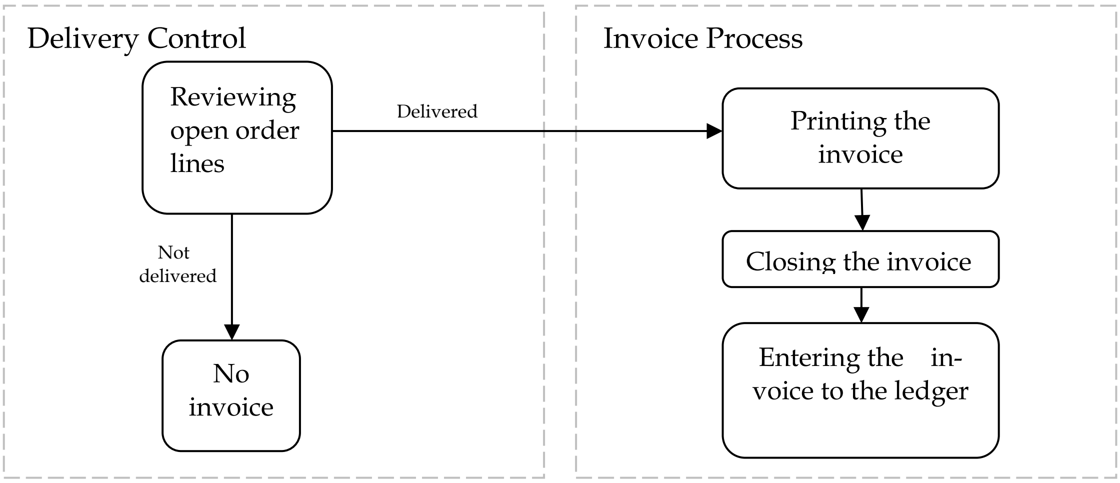

FIGURE 1 The Flow of the Sales Invoice Process in the Case Organization

2.2 Process Automation

Organizations are struggling to meet the modern-day business expectations and are seeking for ways to meet them. The dilemma for many organizations is, that these expectations acquire continuous improvement and new business ideas, but the resources available are not enough to achieve both the maintaining and improvement. In recent years, the need for automation has increased in many industries and production fields, for example, are becoming dependent on it (Mohapatra, 2009). Business Process automation has brought the opportunity for organizations to release some of the existing resources into development and being able to still maintain the current business and its processes. Business Process automation means that part of the process or the whole process is being automated via Information System which communicates between the process actors (Dumas, La Rosa, Mendling & Reijers, 2013) by using advanced technologies (Gartner, 2021).

Robotic Process Automation worked as a driver towards the Business Process automation and its emergence, but in addition to only containing RPA, BP automation covers other automation technologies as well (Rizk, Bhandwalder, Boag & Chakraborti, 2020). Business Process automation technologies are generally considered to be affordable solutions as they support the existing software applications and help define Business Processes (Scheer, Abolhassan, Jost & Kirchmer, 2004). In this chapter, Robotic Process Automation, its implementation, application possibilities and limitations are discussed.

2.2.1 Robotic Process Automation

Robotic Process Automation (RPA) is a relatively new technology in the field of Information Technology. Due to its novelty, Robotic Process Automation is lacking an unambiguous definition or scientific theories (Hofmann, Samp & Urbach, 2020; Madakam, Holmukhe & Jaiswal, 2019). However, similarities in the researchers' definitions can be observed. RPA is a Business Process automation technology (e.g. Madakam, Holmukhe & Jaiswal, 2019) which can be utilized for automation of tasks normally performed by humans (e.g. Asatiani & Penttinen, 2016; Baldauf & Veit, 2018; Fresht & Slaby, 2012; Fung, 2014; Geyer-Klingeberg, Nakladal, Lacity, Willcocks & Craig, 2015).

Syed et al. (2020) define RPA as a Business Processes delivering bots by using a software. Robotic Process Automation works by imitating human performing tasks which are repetitive (Aguirre & Rodriguez, 2017; Santos, Pereira & Vasconcelos, 2020), rule-based (Asatiani & Penttinen, 2016; Geyer-Klingeberg et al. 2018) and require little cognitive effort (Le Clair, Cullen & King, 2017; Leopold, van der Aa & Reijers, 2018). It automates the mouse clicking which is normally done by human (Rizk, Bhandwalder, Boag & Chakraborti, 2020). Despite RPA replacing human work, it is not able to completely take over (Alberth & Mattern, 2017). Humans are needed for more challenging and unpredictable tasks, which would be too difficult to automate. Software robots perform simple and routine-like tasks, freeing up humans' time for tasks that require more cognitive abilities, while increasing employee contentment (Fresht & Slaby, 2012) and the value of employees (Aguirre & Rodriguez, 2017). It can also shape new jobs and has already, including consulting and robot management (Asatiani & Penttinen, 2016).

Instead of using physical robots, RPA uses virtual robots by a software platform (Lacity, Willcocks & Whitley, 2016; Suri, Elia & van Hillegersberg, 2017). These software robots interact by not affecting the application programming interface, but instead the presentation layer by using graphical user interface i.e. not changing the basis of the system (Cewe, Koch, & Mertens, 2017; Lacity, Willcocks & Whitley, 2016; Lacity & Willcocks, 2015). Working at the graphical user interface, the interactions take place like human activity and not inside the software (Asquith & Horsman, 2019). Human activities mean those activities that employees perform in Business Processes, such as mouse clicking or reading data. In RPA, robots generally work with multiple systems and the integration happens in existing software (Geyer-Klingeberg et al., 2018). Hence Robotic Process Automation is considered as a lightweight IT (Willcocks, Lacity & Craig, 2015; Rizk, Bhandwalder, Boag & Chakraborti, 2020) and its implementation compared to application programming interface using technologies is considerably quicker and application possibilities extend to all software (Asatiani & Penttinen, 2016). Lightweight IT in general is cheaper and accessible and many technologies made for consumers, such as smartphone applications, represent it (Brygstad, 2015). RPA is scalable (Lacity & Willcocks, 2017) and being a lightweight IT, the development and implementation does not require so much effort. In addition, operating at the user interface, RPA solutions have more security (Suri, Elia & van Hillegersberg, 2017).

Robotic Process Automation can be considered as a secure automation technology for other reasons as well. Deploying robots eliminates the human error from processes (Alberth & Mattern, 2017) and RPA being suitable for repetitive tasks, which are often precisely the kind of processes where human errors occurs, can e.g. negligence errors be erased. Robots are also more productive (Alberth & Mattern, 2017) and Robotic Process Automation has considerably fast Return on Investment (RoI) (Lacity & Willcocks, 2017; Suri, Elia & van Hillegersberg, 2017).

Development of Robotic Process Automation has taken leaps forward in recent years, enabling it to be utilized even more widely in various processes inside organizations. Artificial Intelligence and machine learning have become part of RPA technology and thus the potential for use of RPA has expanded and for example data mining has become possible with the combination of machine learning and RPA (Madakam, Holmukhe & Jaiswal, 2019). With AI and machine learning, implementing RPA can decrease the need for human work and human involvement further (Alberth & Mattern, 2017).

2.2.2 Implementation of Robotic Process Automation

The implementation of Robotic Process Automation is considered to be relatively simple and fast compared to other Information Technology improvement and development projects. As with other IT projects, in RPA, the implementation phase plays a significant role in the success of IT investment. Geyer-Klingeberg et al. (2018) states that three steps should be pursued while implementing RPA: assess, develop and sustain. Assessing means identifying the potentiality for automation i.e. the process being simple enough and standardized. Developing contains the teaching of the current workflow for the robots. Sustaining in turn focuses on the measuring of the process and the results of the RPA implementation. (Geyer-Klingeberg et al., 2018.)

Alberth and Mattern (2017) have come to a similar conclusion with three key steps for the implementation of Robotic Process Automation: 'the proof of concept', 'the pilot' and 'the leverage phase to other use cases within the company'. The proof of concept, as well as assessing, focuses on identifying the potential processes. The pilot can be compared to the developing as it comprises the optimization of the robots. And as sustaining, the proof of concept focuses on the measuring of the results and also identifying potential processes for automation. (Alberth & Mattern, 2017).

Geyer-Klingeberg et al. (2018) and Alberth and Mattern (2017) focuses on viewing the implementation from the perspective of the implementing organization. Asatiani and Penttinen (2016), in turn, describes RPA implementation process from the RPA supplier perspective in four steps: 'RPA potential analysis workshop', 'process assessment', 'business case proposal' and 'RPA implementation'. RPA potential analysis workshop focuses on finding the potentiality for implementing RPA into the organizational processes (Asatiani & Penttinen, 2016). This workshop can be equated with the assessing by Geyer-Klingeberg et al. (2018) and the proof of concept by Alberth and Mattern (2017). Corresponding step for development and the pilot is the process assessment. It focuses on opening process flow step by step in order to prepare the process as RPA suitable (Asatiani & Penttinen, 2016). The last two steps differ from the views of Geyer-Klingeberg et al. (2018) and Alberth and Mattern (2017). The purpose of business case proposal is to demonstrate the outcome of the implementation to the client organization. The last phase, i.e. RPA implementation comprises the actual development and implementation of the earlier presented solution into the process or processes of the client organization. (Asatiani & Penttinen, 2016.) These four steps are presented in the figure below (Figure 2).

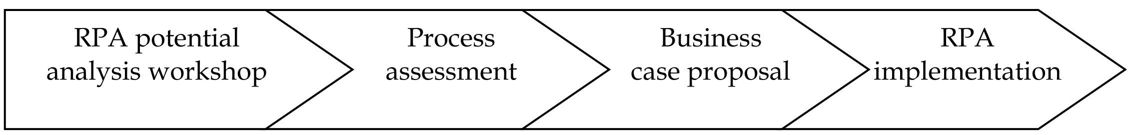

FIGURE 2 Stages of RPA Introduction in the Company (Asatiani & Penttinen, 2016)

Due to the perspective of the party under consideration, there are differences in presented steps. However, these studies show that a successful implementation of Robotic Process automation requires identifying the suitable processes, which have certain characteristics such as not being too complex, optimizing i.e. developing the robots to meet the desired end result and finally, reviewing and maintaining the results without forgetting to seek for new opportunities. In the case of an RPA supplier, successful implementation process involves slightly different steps.

Despite the differences, all of these steps include multiple sub-steps and a successful implementation requires a suitable process above all. Process suitability is discussed in more detail in chapter 2.2.3. These sub-steps vary, but some similarities are noticeable in the literature. Willcocks, Lacity and Craig (2017) introduce an 'Enterprise RPA Maturity Model' developed by Blue Prism. Enterprise RPA Maturity Model encapsulates internal actions i.e. sub-steps required from the organization in order to succeed in the implementation. Maturity Model consists of three key steps: initialization, industrialization and institutionalization (Willcocks, Lacity & Craig, 2017), which compare well with the key steps presented by Geyer-Klingeberg et al. (2018), and Alberth and Mattern (2017). Inside every key step, all suggested functions are divided in three areas: organization, education and capability. The goal for initialization is to build the capabilities. Organizationally, this means outlining the goals of automation and modifying the organizational roles to meet the requirements of RPA. Educationally, the focus is on raising the employees' awareness on RPA and automation in general. The area of capability targets the training of relevant teams and proving the upcoming benefits. Industrialization is the phase, when RPA capabilities are developed, and the solution is implemented. Organizationally, RPA is viewed as a part of IT capabilities and educationally, the benefits are demonstrated to courage employees at finding new processes for automation. In the second key step, the capability focuses on raising RPA awareness more widely inside the organization. The last key step, institutionalization, focuses on the post-implementation time and the normalization of RPA in the organizational culture. Organizationally, the collaboration of RPA and human work seeks to be seamless and the full potential of both is sought. The education area aims to put RPA benefits as essential performance measure and capabilities need to focus on deepening the internal knowledge on RPA and aiming for continuous improvement. (Willcocks, Lacity & Craig, 2017.)

Next to building the capabilities, as a starting point, planning the implementation of RPA requires a clear need for improvement of processes (Alberth & Mattern, 2017) and successful RPA planning requires process optimization. Process optimization helps to identify the issues related to the current situation that can be e.g. bad quality of data or risky vendor dependencies (Gadre, Jessel & Gulati, 2017). By optimizing, the need for improvement is justified.

Justification is needed for employees as well. Alongside business units (Kaelble, 2018; Nelson, 2017), IT department (Beers, Heijnsdijk & Dalen, 2018;

Kaelble, 2018; Kroll, Darius, Enders & Esser, 2018; Wright, Witherick & Gordeeva, 2018) and management, including employees into the automation project from start to end, is essential (Wright et al., 2018). Employee awareness is seen as a key factor behind successful implementation in the literature. While replacing some of the tasks of employees, RPA implementation also generates new ones (Wright et al., 2018) and in order to fulfill the ultimate potential, employees need to be trained and qualified (Geyr, 2015; Kroll et al., 2016). Engaging employees into the project decreases the resistance, which normally slows down IT projects (Geyr, 2015). Geyer-Klingeberg et al. (2018) also identified employees and their active contribution to the development of processes to be automated as an important factor in identifying new possibilities for RPA use-cases.

2.2.3 Application possibilities for Robotic Process Automation

The possibilities with Robotic Process Automation can be nearly endless and it can be applied in principle to any process regardless of the industry the organization is working in. Typical processes that are automated with the use of RPA are so called "swivel chair" processes which are simple and in which employees use multiple systems in order to complete the process (Lacity et al., 2016). Some concrete examples of processes to which RPA applies are e.g. invoicing (Madakam, Holmukhe & Jaiswal, 2019), responding to frequent customer inquiries (Gadre, Jessel & Gulati, 2017; Syed et al., 2020) and data transferring (Asquith & Horsman, 2019; Syed et al., 2020). However, what determines whether the implementation of RPA is ultimately profitable, is the nature of the process. In practice, the same process or a process bearing the same name can work completely differently in different organizations. The suitability of RPA is therefore very difficult to determine based on processes alone and instead it should be considered in the light of characteristics of the processes. When implemented in processes with suitable characteristics, the full potential of Robotic Process Automation will be exploited. Typical characteristics were extracted from the reviewed literature and their frequency was scouted. Eight most common process characteristics were identified behind a successful implementation of RPA: frequency, use of numerous systems, constancy, minor need for cognitive thinking, describable unambiguously, occurring human errors, standardized and clear cost structure. All the frequent characteristics of applicable processes are presented in the table below (Table 1).

Asatiani and Penttinen (2016) states frequency as one of the main characteristics for RPA applicable process. Frequency refers to the repetitiveness of the process (Hofmann, Samp & Urbach, 2019). These processes are routine-like and often performed on a daily basis. Applying Robotic Process Automation for frequent processes will prominently save time from employees and the benefits are considerable in daily work freeing up time for other tasks. The use of numerous systems refers to the swivel chair processes (Lacity et al., 2016). Running processes often requires the use of several systems and RPA is suitable for and effective at jumping between different systems and transferring data (Fung, 2014;

Slaby, 2012). Constancy, in turn, indicates that the systems that are used in the process are stable. The system environment is preordained and permanent (Asatiani & Penttinen, 2016). If the system environment is changing and not stable, it requires constant modifying of the programming which reduces the benefit of RPA by increasing the amount of maintenance associated with it. Minor need for cognitive thinking is also considered as one of the main characteristics for an RPA applicable process (Asatiani & Penttinen, 2016). Without the use of AI or machine learning, Robotic Process Automation is only capable of running processes which require minor need for cognitive thinking and are also describable unambiguously. This means that the whole process can be described from start to end step by step (Asatiani & Penttinen, 2016). One recurring characteristic in the literature is occurring human errors. This refers to errors which are solely specific to humans and not to computers (Asatiani & Penttinen, 2016). For example, while reading and transferring data where accuracy is an important factor, RPA performs better than humans eliminating human errors and maintaining consistency. Clear cost structure helps to identify the real impact on RoI (Asatiani & Penttinen, 2016). Understanding the costs helps already in the finding of potential use cases for RPA inside the organization.

TABLE 1 Typical Characteristics for RPA Compliant Processes

CHARACTERISTICS	REFERENCES
Frequency	(Asatiani & Penttinen, 2016; Fung, 2014; Gadre, Jessel & Gulati, 2017; Hofmann, Samp & Urbach, 2019; Lacity and Willcocks, 2015, 2017; Madakam, Holmukhe & Jaiswal, 2019; Moffitt, Rozario & Vasarhelyi, 2018; Slaby, 2012; Van der Aalst, Bichler & Heinzl, 2018)
Use of numerous systems	(Anagnoste, 2017; Asatiani and Penttinen, 2016; Fung, 2014; Gadre, Jessel & Gulati, 2017; Lacity & Willcocks, 2015, 2017; Lacity et al., 2016; Madakam, Holmukhe & Jaiswal, 2019; Moffitt, Rozario & Vasarhelyi, 2018; Slaby, 2012; Syed et al., 2020; Van der Aalst, Bichler & Heinzl, 2018)
Constancy	(Asatiani and Penttinen, 2016; Anagnoste, 2017; Fung, 2014; Lacity and Willcocks, 2015; Slaby, 2012)
Minor need for cognitive thinking	(Asatiani & Penttinen, 2016; Fung, 2014; Slaby, 2012)
Describable unambiguously	(Asatiani and Penttinen, 2016; Fung, 2014; Lacity and Willcocks, 2015; Slaby, 2012)
Occurring human errors	(Asatiani and Penttinen, 2016; Fung, 2014; Gadre, Jessel & Gulati, 2017; Slaby, 2012)
Standardized	(Fung, 2014; Lacity and Willcocks, 2017; Moffitt, Rozario & Vasarhelyi, 2018; Slaby, 2012; Van der Aalst, Bichler & Heinzl, 2018)
Clear cost structure	(Asatiani & Penttinen, 2016; Fung, 2014; Lacity & Willcocks, 2015; Slaby, 2012)

All the characteristics presented above refer to the maturity of the process. Mature process is measurable, and its characteristics are clearly identifiable (Lacity, Willcocks & Craig, 2015; Santos, Pereira & Vasconcelos, 2020). The more of these eight characteristics the process possesses, the more mature it is, and the more suitable RPA is to be applied in it. Being lightweight IT, the implementation of Robotic Process Automation is profitable as long as it remains within a reasonable timeframe and simplicity. If the process to be automated is too complex and variable, the costs of exploiting RPA grow too high in relation to the benefits.

2.2.4 Robotic Process Automation and Limitations of Application and Implementation

As with all technology implementations inside organizations, Robotic Process Automation as well involves risks and factors that prevent its application or complicates its implementation. A failed implementation can lead to an inefficient outcome (Alberth & Mattern, 2017) and first of all, selecting unsuitable process only negatively affects organizational efficiency (Gadre, Jessel & Gulati, 2017). However, when viewing the factors, that lead to the failure of implementing Robotic Process Automation, broader perspective should be considered. In addition to processes and their functions, organizational factors also play a role in the implementation of RPA. Typical factors leading to an unsuccessful implementation of Robotic Process Automation or limiting its application were extracted from the reviewed literature. Six recurring factors were identified: inapplicable process, lack of terminology understanding, imbalance between IT and business, unrealistic RoI expectations, lack of maintenance and social impact. All the factors behind unsuccessful RPA implementation are presented in the table below (Table 2).

The first factor is inapplicable process. Limitations related to the applicable processes are generally opposite to the characteristics for Robotic Process Automation compliant processes presented in the chapter 2.2.3. Limitations like these can be e.g. complexity of the process (Alberth & Mattern, 2017; Asatiani & Penttinen, 2016), non-stable system environment (Asquith & Horsman, 2019) or the process containing any data in paper form (Alberth & Mattern, 2017). If the process maturity is low and it involves e.g. making cognitive decisions, the implementation would simply take too much time and cost too much compared to keep completing the process with human work (Gadre, Jessel & Gulati, 2017). The benefits would not be sufficient from the organization point of view and it is more profitable to continue the process with human resources.

The second occurring factor is lack of terminology understanding. This suggest, first, an understanding of what Robotic Process Automation and its application means in general (Suri, Elia & Hillegersberg, 2017). Research has found that the vocabulary is often misleading, leading to misunderstandings within organizations (Willcocks, Lacity & Craig, 2015). Used terminology should be clear and understandable to everyone involved in the implementation project to avoid any ambiguity that could lead implementation slowdowns, errors or even failures.

The third factor is imbalance between IT and business. The imbalance is twofold in terms of both the perspective used and the responsibilities of the internal departments. Organizations often tend to view the need for RPA as a technology problem, although the need should be a business problem instead (Gadre, Jessel & Gulati, 2017; Lamberton, Brigo & Hoy, 2017). When considered from the technology perspective, the problems might turn out to be incorrect or focusing on fixing everything and not viewing robotics as a part of a bigger solution, consisting of several different tools. (Gadre, Jessel & Gulati, 2017.) Also affecting the ownership, the technology point of view can result in RPA being thought of IT-owned, when the best outcome would be when considered as business owned (Lamberton, Brigo & Hoy, 2017). Willcocks, Lacity and Craig (2015) state that the effectiveness of RPA requires involving the IT and business departments. The division of responsibilities between the two departments is important and even creating a separate team for RPA is suggested (Stople, Steinsund, Iden & Bygstad, 2017).

Involving both the IT and business in the implementation process of RPA from identifying to the maintenance also reduces the chances of unrealistic expectations. The involvement of both parties helps to set realistic goals, both short- and long-term. Long-term goals are particularly important, since using automation as a quick fix for problems that lie deeper, is never a good solution. Gadre, Jessel and Gulati (2017) state that if the process itself is not working, the automation will only make the problem worse. One of the challenges in RPA is the expectations on RoI to be similar and comparable to other digital transformation projects (Gadre, Jessel & Gulati, 2017). Even though RPA is considered as a fast RoI enabler, the road to it is not straightforward. In the same way as many other technology projects, the RoI acquires that all the steps starting from defining and planning, are successfully and thoroughly completed. The final outcome and impact on the business is never seen quickly and the change should be considered over a long period of time and long-term goals should also be taken into account when making an investment decision (Gadre, Jessel & Gulati, 2017). Lamberton, Brigo and Hoy (2017) support this thought with stating, that it is a common mistake to consider RPA as only a tool for getting a fast or great RoI.

Besides the expectations set on RPA implementation, consideration of maintenance is also an important factor in successful implementation (Gadre, Jessel & Gulati, 2017; Lamberton, Brigo & Hoy, 2017; Stople, et al., 2017; Willcocks, Lacity & Craig, 2015). Without monitoring, maintaining and managing, the robot can turn out to be less effective than a human would (Gadre, Jessel & Gulati, 2017). RPA maintenance consumes resources and its responsibility has become a problem in organizations (Stople, et al., 2017). Willcocks, Lacity and Craig (2015) have suggested hiring an RPA analyst to manage the suitable opportunities and maintain the solutions. Asquith and Horsman (2019) states that a good housekeeping is needed in order to maintain all operations and files to remain consistent with the robot programming. Modifying the programming of RPA is more difficult and time-consuming compared to taking care of specified operations such as locations or naming conventions (Asquith & Horsman, 2019).

The last occurred factor is social impact. The social impact can be viewed both organizationally and individually. Organizationally this means that the social impact should be considered already at the planning phase (Alberth & Mattern, 2017). The management of organization should have an understanding and to be able to communicate clearly what automation means for the organization and how it affects the tasks of employees daily. This also helps identifying the real need for automation and setting realistic goals for it, as well as the utilization of released resources. From the individual perspective, competition between employees and robots may occur, and robots are often perceived as a threat (Asatiani & Penttinen, 2016; Suri, Elia & Hillegersberg, 2017). To prevent this, communication on the part of the organization is especially important, as the feeling of threat has also led to a decrease in work moral and employees have been found to be skeptical towards RPA and automation in general (Asatiani & Penttinen, 2016). Skepticism often manifests as a resistance to change and Willcocks, Lacity and Craig (2017) state that there is a relevant risk of employees' resistance towards the use of RPA.

TABLE 2 Typical Factors Behind Unsuccessful RPA Implementation

FACTORS	**REFERENCES**
Inapplicable process	(Alberth & Mattern, 2017; Asatiani & Penttinen, 2016; Gadre, Jessel & Gulati, 2017; Lamberton, Brigo & Hoy, 2017)
Lack of terminology understanding	(Suri, Elia & Hillegersberg, 2017; Willcocks, Lacity & Craig, 2015)
Imbalance between IT and business	(Gadre, Jessel & Gulati, 2017; Lamberton, Brigo & Hoy, 2017; Suri, Elia & Hillegersberg, 2017; Willcocks, Lacity & Craig, 2015)
Unrealistic RoI expectations	(Gadre, Jessel & Gulati, 2017; Lamberton, Brigo & Hoy, 2017)
Lack of maintenance	(Gadre, Jessel & Gulati, 2017; Lamberton, Brigo & Hoy, 2017; Stople, et al., 2017; Willcocks, Lacity & Craig, 2015)
Social impact	(Alberth & Mattern, 2017; Asatiani & Penttinen, 2016; Suri, Elia & Hillegersberg, 2017)

According to the literature, in addition to process characteristics, there are other influencing factors that contribute to the successful implementation of RPA as well. These factors emerge at all stages of implementation and their effects might only be seen afterwards. Not setting goals, sharing responsibilities or having clear communication and continuous maintenance may result in implementation failure. The social impact is perceived as a limiting factor for RPA application and implementation, as resistance to change can effectively ruin the integration of technology. The factors that lead to the success of RPA implementation are discussed in more detail in the following chapter 2.3.

2.3 Success Factors in Robotic Process Automation Projects

Keeping organizations competitive nowadays requires the use of Information Technology as part of its Business Processes. Business benefits are sought through Information Technology and Information Systems (IS) projects and research on project success, especially Information Technology project success, has grown significantly in recent decades. Project is an instantaneous activity within the resources, such as people, time and budget, allocated to it to achieve a predefined goal (Schwalbe, 2010). Every project is different, making them unique and varied, notably in the case of IT projects, which are more vulnerable to internal and external changes and disruption compared to projects in other fields (Rodriguez-Repiso, Setchi & Salmeron, 2007; Schwalbe, 2010). IT projects being perceived as high-risk projects (Rodriguez-Repiso et al, 2007), project management has been recognized as a particularly important factor for the success of the project (Liu & Horwitz, 1989). Project management is the means, such as skills, knowledge, tools and techniques, that are utilized to achieve the desired outcome i.e. project success (Munns & Bjeirimi, 1996). According to Schwalbe (2010), IT project management requires knowledge from both the Information Technology and business side, since IT projects extend to all business functions. This chapter focuses on project success in IT projects, more specifically in RPA projects, and examines the Critical Success Factors in Robotic Process Automation projects.

2.3.1 Critical Success Factors

The definition of project success can vary in different contexts and for different factors (Freeman & Beale, 1992). For Information Technology projects, the traditional definition for project success is that the project meets the set goals in terms of time, quality, risks and costs (Guo, 2019; Rodriguez-Repiso et al., 2020). This traditional definition is known as a golden triangle, where time, budget and quality are paramount (Westerveld, 2003). However, the golden triangle model has later been found to be limited causing widespread project failure (Rodriguez-Repiso et al., 2020; Savolainen et al., 2012). The definition for project success should be broader, since it only targets internal factors. For instance, Rodriguez-Repiso et al. (2020) and Savolainen et al. (2012) suggest that the golden triangle is completely lacking the point of view of the end-user. The researches by Van Aken (1996) and Atkinson (1999) support this by highlighting the importance of stakeholders' satisfaction in the project success.

Previous research has identified varying key factors behind successful IT projects. Key factors, which are considered essential in achieving the success, are defined as Critical Success Factors (CSFs) (Bullen & Rockart, 1981). CSF is a direction in project success research, and it was first introduced by Rockart (1979). Bullen and Rockart (1981) states that satisfaction with Critical Success Factors assures the success of an individual, department or organization. Subsequently, the research on CSFs has widened on Critical Success Factors in IT projects. Sudhakar

(2012) identified recurring CSFs in software projects from the literature and classified them into seven categories: communication factors, team factors, organizational factors, technical factors, environmental factors, product factors and project management factors. The conceptual model of Critical Success Factors and their relation to project success by Sudhakar (2012) is presented in the figure below (Figure 3).

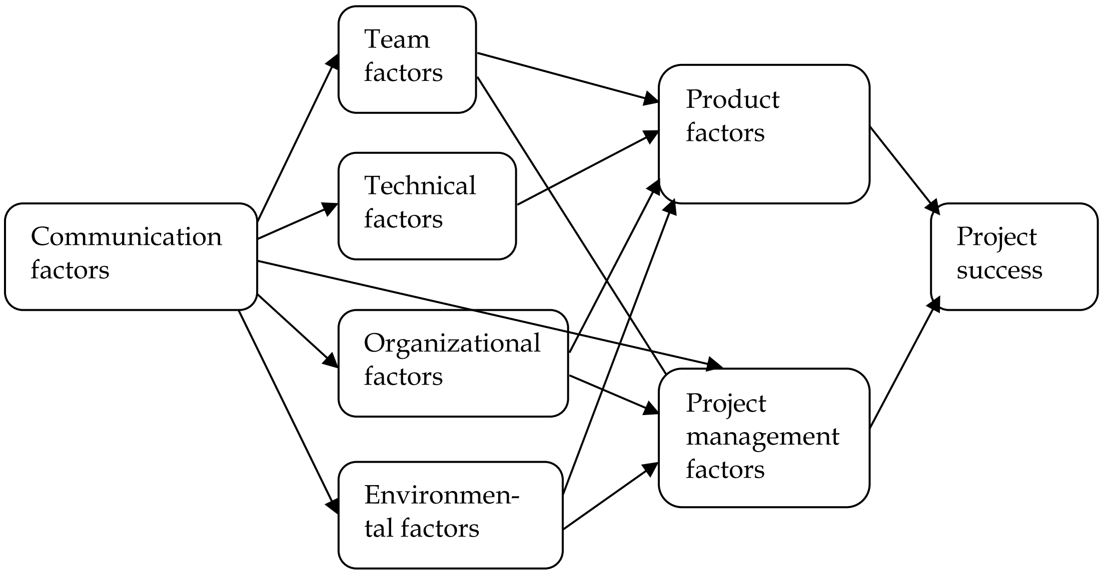

FIGURE 3 The Relationship of the Model with Project Success (Sudhakar, 2012)

Each category contains individual success factors from which Sudhakar (2012) identified the five most common factors in the literature for each category and suggests that empirical analysis of Critical Success Factors in developments teams can be formed by these categories and their factors.

For the first category, communication factors, Sudhakar (2012) cites communication in project, leadership, relationship between users and developers, reducing ambiguity and maximizing stability as the five most important factors. For team factors, he names team capability and competence, teamwork, selecting right project team, project team coordination and task orientation. Organizational factors instead are top management support, realistic expectations, organization politics, financial support and power. For technical factors, technical tasks, trouble shooting, technical uncertainty, technical implementation problems and integration of the system are the most significant factors. The fifth category, environmental factors, includes user involvement, customer involvement, vendor partnership, external environment events and client acceptance. For product factors, accuracy of output, reliability of output, timeliness of output, quality control and documentation of systems and procedures, are presented. And for the last category, project management factors, he specifies project planning, project control mechanisms, project schedule, project manager's competence and clear project goal as the most relevant factors. (Sudhakar, 2012.) The CSF model by Sudhakar

(2012) is made for software projects in general and the next chapter discusses Critical Success Factors in Robotic Process Automation projects.

2.3.2 Critical Success Factors in Robotic Process Automation projects

Critical Success Factors in RPA projects have not been discussed excessively in previous research. Research on RPA project success factors, however, can be found more frequently in the literature (i.e. Lande et al., 2016; Müller & Jugdev, 2012; Niazi, 2015). Plattfaut et. al (2022) studied CSFs in RPA projects and identified 32 Critical Success Factors through literature review and empirical research. Identified CSFs can be divided into Critical Success Factors for RPA in an organization, RPA development and RPA operations. These CSFs are presented in the table below (Table 3).

TABLE 3 Critical Success Factors in Robotic Process Automation Projects (Plattfaut et al., 2022)

Category	Critical Success Factor	References
CSF for RPA in an Organization	Make Top Management support RPA actively and drive a culture of change	(Asatiani & Penttinen, 2016; Tarafdar & Beath, 2018)
	Involve operational and IT staff early	(Asatiani & Penttinen, 2016; Schmitz et al., 2019)
	Actively plan and develop the necessary skills of employees	(Asatiani et al., 2019; Fernandez & Aman, 2018; Kokina et al., 2019; Schmitz et al., 2019)
	Define RPA governance in terms of technology, standards, and organization	(Bygstad, 2017, 2015; Polak et al., 2020)
	Integrate RPA into overall process optimization program	(Osmundsen et al., 2020; Schmitz et al., 2019)

(cont.)

Table 3 (cont.)

	Address and communicate the impact on human labor and employees job satisfaction early	(Güner et al., 2020; Hallikainen et al., 2018; Penttinen et al., 2018; Ranerup & Henriksen, 2019)
	Investigate automation alternatives	(Lacity and Willcocks, 2016)
	Ensure alignment of RPA initiatives with the overall strategy	(Asatiani & Penttinen, 2016; Schmitz et al., 2019)
	Approach RPA strategically and not only as a tool for headcount reduction	(Asatiani & Penttinen, 2016; Fernandez & Aman, 2018)
	Use a staged approach with a PoC and create an MVP focusing on technology, skill, governance, regulation, etc.	(Asatiani & Penttinen, 2016; Bygstad, 2017; Güner et al., 2020; Kanakov & Prokhorov, 2020; Koch et al., 2020; Kokina & Blanchette, 2019; Lacity et al., 2016; Raza et al., 2019; Uskenbayeva et al., 2019)
	Be aware of the process costs as a basis for the creation of a business case	(Asatiani & Penttinen, 2016)
	Be aware and communicate the limitations of RPA	(Syed & Wynn, 2020)
	Ensure sufficient process knowledge as the basis for automation	
CSF for RPA Development	Ensure managerial engagement across the RPA project	(Bygstad, 2017; Fernandez & Aman, 2018; Kokina et al., 2019)

(cont.)

Table 3 (cont.)

	Involve all relevant stakeholders - especially process and IT specialists	(Bygstad, 2015; Denagama Vitharanage et al., 2020; Hallikainen et al., 2018; Kokina & Blanchette, 2019; Kokina et al., 2019; Lacity & Willcocks, 2016; Osmundsen et al., 2020; Penttinen et al., 2018; Ratia et al., 2015; Schmitz et al., 2019)
	Actively train employees for changing role	(Fernandez & Aman, 2018; Güner et al., 2020; Lacity & Willcocks, 2016; Osmundsen et al., 2020; Ranerup & Henriksen, 2019)
	Ensure compliance with IT, organization and security policies and establish supporting tools/ processes	(Asatiani et al., 2019; Fernandez & Aman, 2018; Kanakov & Prokhorov, 2020; Koch et al., 2020; Kokina & Blanchette, 2019; Lacity & Willcocks, 2016; Polak et al., 2020; Raza et al., 2019; Tarafdar & Beath, 2018)

(cont.)

Table 3 (cont.)

	Select and strategically develop processes according to established criteria	(Aguirre & Rodriguez, 2017; Asatiani & Penttinen, 2016; Asatiani et al., 2019; Bygstad, 2017; Hallikainen et al., 2018; Kanakov & Prokhorov, 2020; Koch et al., 2020; Kokina & Blanchette, 2019; Kokina et al., 2019; Lacity & Willcocks, 2016; Penttinen et al., 2018)
	Carefully manage the internal communication and staff redeployment	(Asatiani & Penttinen, 2016; Fernandez & Aman, 2018; Güner et al., 2020; Kokina et al., 2019; Lacity & Willcocks, 2016)
	Ensure adequate documentation and knowledge management	(Kokina et al., 2019)
	Create a center of excellence that concentrates resources and knowledge	(Bygstad, 2015; Kokina et al., 2019; Osmundsen et al., 2020)
	Design for scalable and flexible solutions with a maintainable setup	(Aguirre & Rodriguez, 2017; Asatiani et al., 2019; Bygstad, 2017; Fernandez & Aman, 2018; Kokina et al., 2019; Lacity and Willcocks, 2016)
	Use a standardized and structured development approach	
	Use vendors to skill up the organization.	
CSF for RPA Operations	Ensure sufficient resources and priority of tasks	(Osmundsen et al., 2020)
	Ensure sufficient process knowledge to monitor bot	(Asatiani et al., 2019)

(cont.)

Table 3 (cont.)

Train operative employees for maintenance tasks	(Asatiani et al., 2019)
Ensure compliance with existing governance as solutions scale and adapt tools and processes	(Bygstad, 2017; Hallikainen et al., 2018; Kokina et al., 2019; Osmundsen et al., 2020; Romao et al., 2019)
Plan for continuous improvement for automation solutions	(Penttinen et al., 2018)
Adapt the organizational security framework to fit RPA	(Raza et al., 2019)
Externalize the knowledge of the employees and ensure continuous knowledge management across the organization	(Asatiani et al., 2019)
Continuously ensure high data quality in prior manual processes	

When comparing the CSFs by Plattfaut et. al. (2022) to the CSFs by Sudhakar (2012), some similarities can be noted. The model for Critical Success Factors by Sudhakar (2012) has been around for a longer time and its effectiveness has been proven in several research over the years (e.g. Ahimbisibwe, Cavana & Daellenbach, 2015). However, the model has been developed specifically for software projects at a general level and cannot be directly attributed as RPA-specific. The CSFs by Plattfaut et. al. (2022) are specifically for RPA projects and the framework being new, its functionality has not yet been extensively studied. Despite, the research was conducted with the utilization of a considerable systematic literature review, qualitative analysis of expert interviews and cross-validation.

2.4 Summary of Literature Review

This literature review was divided into three main sections. The first section defined Business Process Management, Business Process and Business Process automation. The process relevant to the research, the sales invoice process, was also presented and modeled. Robotic Process Automation was discussed in the second section. Its implementation, application possibilities and application limitations were considered, and a broad understanding of RPA, its applicability and operation was formed in the context of this research. The third section focused on success factors in Robotic Process Automation projects. The section defined the Critical Success Factors, as well as their manifestation in general in Information Technology projects and in more detail in RPA projects. The purpose of the literature review was to create a clear theoretical basis for the research topic based on the existing research, which supports the elucidation of the research problem.

Processes are a central part of business in organizations. A Business Process is a set of functions that have a logical purpose and dependence on the desired outcome set by the organization. To achieve the desired outcome, Business Process Management (BPM) tools are utilized. Expectations for the level and quality of BPM today are high and continuous improvement and new business ideas are constantly required. Business Process automation, i.e. the automation of processes or part of them with Information Systems, provides a way to achieve the goals of the organization without compromising the current business.

Financial Business Processes are a key part of the business and with their digitalization, traditional financial management has shifted to intelligent financial management. Financial management includes monitoring and reporting of financial events of the organization and there are several different processes within it. Central to this research from these processes is the sales invoice process. In this research, the sales invoice process refers to a process that consists of two main functions: delivery control and invoice process. In the delivery control, open order lines are reviewed and delivered lines are marked as ready for invoicing. In the invoice process, an invoice is printed on the delivered lines, the invoice is closed and then entered to the ledger.

RPA is a Business Process automation technology that automates processes that are repetitive, routine-like and require low level of cognitive abilities. It is considered as lightweight IT and works with a graphical user interface mimicking human activity, such as clicking or reading data. Lightweight IT, as well as RPA, is generally quicker to implement, cheaper, accessible and more secure. Compared to humans, RPA is faster, more error-free and productive. In the implementation of Robotic Process Automation, the following three key steps should be completed: identifying the suitable processes, developing the robots and reviewing and maintaining the results.

However, there are other important factors around these key steps including having a clear need for improvement, both from a process perspective and from an employee perspective and identifying new processes for automation. Profitable implementation depends to a large extent on the suitability of the process, which can be determined by its characteristics. The eight most suitable characteristics are: frequency, use of numerous systems, constancy, minor need for cognitive thinking, describable unambiguously, occurring human errors, standardized and clear cost structure. These characteristics represent the maturity of the process and the more mature the process, the more sensible and productive it is to automate with RPA. Besides the process not being mature enough, organizational factors together with team factors also affect the success of an RPA implementation. Six recurring factors leading to unsuccessful implementations are: inapplicable process, lack of terminology understanding, imbalance between IT and business, unrealistic RoI expectations, lack of maintenance and social impact.

RPA implementation can be considered as an Information Technology project. Project is an instantaneous activity within the resources, such as people, time and budget, allocated to it to achieve a predefined goal. IT projects are perceived as high-risk projects, making project management, that contains knowledge from both IT and business side, particularly important for the success of the project. The definition of project success depends on the context and factors. The success of Information Technology projects has traditionally meant meeting preset goals in terms of time, quality, risks and costs, but the vision has been extended to include stakeholders alongside internal metrics.

The most relevant factors behind success have been identified as Critical Success Factors (CSF) in the literature, and in software projects seven key categories have been identified as critical: communication factors, team factors, organizational factors, technical factors, environmental factors, product factors and project management factors. Existing research on CSFs for Robotic Process Automation projects is limited and therefore further research is needed. 32 Critical Success Factors in RPA projects have been identified in one research and are divided into three categories: Critical Success Factors in RPA in an organization, RPA development and RPA operations. As these 32 CSFs are the result of a recent research, more extensive research is needed in practice.

Based on the literature review, this research aims to form a more accurate view of the Critical Success Factors in RPA projects in the empirical part. The empirical section focuses on identifying the CSFs from a large organization perspective, thus complementing the existing research. Conducting the empirical part of this research has been directed by the challenges that appeared during the implementation of Robotic Process Automation in the case organization, which have created an interesting basis for conducting the research. The lack discovered in the literature review of Critical Success Factors in RPA projects motivates the conducting of the empirical data and complementing the research. The empirical part of the study is presented in the following section, chapter 3.

3 RESEARCH METHODS

In this section, the empirical part of the research is described. First, the case company is introduced, followed by a definition of the chosen research method. In addition, data collection is described and last the methods of data analysis are explained.

3.1 Case Company Description

The case company is a large global water technology company with over 16 500 employees operating in more than 150 countries. The Commission of European Community (Commission, 2021) defines an enterprise as large if it has more than 250 employees. The case company operates throughout the whole water cycle with the focus on two main areas: water infrastructure and applied water. This case research has a focus on the EMEA region units including Sweden, United Kingdom (UK), Finland and Denmark, in which the implementation of Robotic Process Automation has been attempted to complete for internal sales' ja sales invoicing processes at the time of the research. The units under consideration in the case organization can be divided into two different groups based on the processes to be automated. Sweden, Finland and Denmark have focused only on the sales invoicing process, while UK has extended to automate internal sales' processes, including credit note audit, managing customer enquiries, orders cleared by credit, populate quote system with information, contracts order processing and reading unstructured or incomplete data from emails of images. The sales invoice process is an everyday task in the case organization and its units, and it has previously been performed manually using several different systems in all of the units. The case company being an old company, its Information Technology environment is also old and branched including many manual tasks that would be more efficient and timesaving to automate. The aim of the pilots was to reduce manual work, improve customer service and accuracy of the process.

Robotic Process Automation implementation project first started in 2018. Sweden worked as the test pilot for the project followed by projects in United Kingdom, Finland and Denmark in 2021. Project delivery in Sweden took 4 months from process mapping and definition to final deployment. At the time of this research, projects in UK, Finland and Denmark are still pending due to unexpected delays, which will be further addressed in chapter 4. In UK, process mapping and definition, as well as the development of some processes, have been completed, but the project has not reach implementation phase yet. In Finland and Denmark, implementation has been attempted to complete, but there have been issues with deployment that have delayed it. Two different RPA supplier were used in the pilots to explore different options and due to the use of different

Enterprise Resource Planning (ERP) systems: the same supplier in Sweden, Finland and Denmark and a different supplier in the United Kingdom.

The case company plans to extend the implementation of RPA to other units and processes in the future and this empirical research is used to map the success factors for RPA implementation and the perceived benefits and challenges. The aim is to create an understanding that will allow for better success in future implementation and at the same time create interest and willingness of different units towards RPA solutions.

3.2 Methods

The empirical part of this research was conducted as a qualitative case study. Qualitative research looks at phenomena from the perspective of actors (Glesnen & Peshkin, 1992), in this research the case organization. The purpose was to examine the factors behind successful Robotic Process Automation implementation project and Feagin, Orum and Sjoberg (1991) suggest that with case study, the phenomenon can be studied holistically and extensively. Case study is suitable for research that aims to explain recent phenomena (Hirsijärvi, Remes & Sajavaara, 2004, p. 129) and the existing literature is rather narrow (Benbasat, Goldstein & Mead, 1987). The understanding of Critical Success Factors in specifically Robotic Process Automation implementation projects in practice is still incomplete, and existing research on CSFs focuses more on generally software projects. Based on this and the theory section of this research, it can be stated that the case study on the phenomena is justified.

3.3 Data collection

Qualitative case study can be conducted in different methods: such as interviews, observations or surveys (Yin, 2003). In this research, data was collected through semi-structured interviews. Semi-structured interview is flexible method and it follows pre-defined themes and same questions for all interviewees, leaving room for individual discussion depending on the emerging topics during the interview. Hirsijärvi and Hurme (2008) state, that interviews work as research method for an area for which there is not yet much existing research data (Hirsijärvi & Hurme, 2008).

The research problem consisting of identification of the factors that lead to success, interviewees were selected from internal project teams of the case organization with the involvement of both from management and organizing level, as well as process owners whose tasks were automated with RPA. The selection of the interviewees was made in such a way that the interviews provided the widest possible understanding of the implementation project of each unit from different perspectives. The different backgrounds of the interviewees also allow for different views on the project and success factors. Hirsijärvi and Hurme (2008) suggest, that selection of interviewees according to their competence and suitability makes sense in order to obtain more detailed data on the phenomenon.

The aim of the interviews was to find out, how to make the implementation of RPA a success and what factors have caused the differences in the success of RPA implementation projects of the different units. The interview template was compiled iteratively in parallel while conducting the theoretical part of the research. The formation of the final interview questions was guided by the observation of the RPA project of the case organization and familiarization with the literature. Conclusions made on the theoretical part of the successful RPA implementation project and the factors leading to it were utilized, and the questions were formed to examine the flow of the implementation project, the view of the success of the implementation project, and the success and failure factors of the implementation project, effects after the implementation, key success factors in RPA implementation projects, and future prospects for RPA in the case organization. The interview template can be found in Appendix 1 (Appendix 1).

The interviews were conducted in the spring of 2022 through face-to-face interviews and Teams-meetings, depending on the geographical location of the interviewees. All interviews were conducted as individual interviews and lasted from 17 to 58 minutes. The themes covered in the interview were presented to the interviewees approximately a week before the interview, together with the purpose of the research. In interview situations, the same interview template was followed and if necessary, additional questions were asked to seek a deeper understanding of the issues brought up by the interviewees. An effort was made to give the interviewees the opportunity to describe their views freely, regardless of the theoretical background, and the additional questions sought clarifications, which enabled the answers to be reviewed in parallel with the theory. Interviews were recorded and transcribed into a text format for the analysis immediately after the interviews, in order to improve the reliability of the collected data (Hirsijärvi & Hurme, 2008). The selected interviewees and their backgrounds are presented in table below (Table 4).

TABLE 4 Backgrounds of the Interviewees

Interviewee	Role	Time at the Case Organization	Role in the RPA Project
Interviewee 1	Customer Support Manager	13 years	Project Team Member
Interviewee 2	Logistics and Invoice Manager	10 years	Process Owner
Interviewee 3	Continuous Improvement Manager	10 years	Project Manager
Interviewee 4	Operations Director	3,5 years	Project Manager
Interviewee 5	Operations Manager	8 years	Project Coordinator
Interviewee 6	Logistics Planner	2,5 years	Project Team member
Interviewee 7	Supply Chain Planner	6 years	Process Owner
Interviewee 8	Finance	2,5 years	Process Owner

3.4 Data analysis

After all the interviews were conducted and transcribed, a data analysis was performed. The analysis method for this research was selected as thematic content analysis, which allows for descriptive presentation of the data (Anderson, 2007). Recurring themes are sought from the data, which enables to identify the factors and the connections between them. Thematic content analysis was therefore considered as the most suitable analysis method for this research, since the aim was to identify the impact and success factors of RPA implementation projects.

Data analysis followed the common steps of thematic content analysis: transcriptions of interviews were first made, following with familiarization of the text. After that, the text was coded and thematized. Themes derived from the conducted interviews were RPA implementation project, failure and success factors in RPA implementation project, impacts after implementation of RPA, key success factors for RPA projects and future prospects of RPA in the case organization. From these themes, subthemes and related factors and their possible effects were then identified using Excel as a tool. The analysis was guided on the one hand by the conclusions made in the literature and on the other hand by the significances found in the interview data. Recurring themes were identified and their association with the theory was examined. This made it possible to compare the data with the existing literature and at the same time to identify new information. The results of the analysis are discussed in the chapter 4.

4 RESULTS

In this section, the results of the data analysis of the interviews are presented. The results are reviewed thematically as follows: Robotic Process Automation implementation project, failure and success factors in Robotic Process Automation implementation project, impacts after implementation of Robotic Process Automation, key success factors in Robotic Process Automation implementation projects and future prospects for Robotic Process Automation in the case organization. For each theme, categories and factors are also described and their impacts open.

4.1 Robotic Process Automation Implementation Project

By reason of the implementation project of RPA in the case organization has been implemented in different units, the interviewees were asked to describe the flow of the project from their own perspective. The aim was to find out the differences between the four projects in Sweden, United Kingdom, Finland and Denmark. This section describes the main differences that emerged from the interviews.

The RPA implementation project in Sweden worked as a pilot for the Nordics, which includes Sweden, Finland and Denmark in the case organization. The pilot project required more preliminary work, such as administrative decisions. Preliminary work took time and the project took longer to move to the development phase than in Finland and Denmark. For this reason, Finland and Denmark also lacked preparatory challenges in the project. According to interviewee 3, more time was also spent on defining the processes:

> We spent much more time on identifying the correct processes to move on with the robot. Instead in Finland and Denmark, we said that we copy those processes, so billing and delivery notification. That's the main difference. So, we spent a lot more time in that, evaluating and investigating and having people in workshops. Trying to find out what is the most repetitive processes that they are doing, that are taking a lot of time from a lot of people.

All interviewees from Sweden felt that the project had been successful in the end, but there were problems with implementation at first. According to interviewee 1 and 2 there are still some occasional errors occurring, but the reason for their occurrence is not clear. However, the benefits of invoicing automation have been so great that random errors were not perceived as a disturbance.

The biggest differences between projects in Sweden, Finland and Denmark were the clarification of the need for RPA, defining the processes and the prioritization of the project based on the interviews. Copying the processes from Sweden to Finland and Denmark was not the right decision, according to the interviewees. Interviewees 6, 7 and 8 felt that there were very few benefits on automating the invoicing process with RPA, as the time spent on the process on a daily basis is very short. According to interviewee 3, project teams could have had a better understanding of why RPA is being deployed:

> Here [in Finland] could've been a better understanding why we were doing it. The gain from it. So, the gain is that the process owner will be able to do other things than just only taking out a list, checking that system and checking that system.

The prioritization of the project was felt to be incomplete in the opinion of interviewees 5 and 7, whereas the project was prioritized in Sweden according to interviewee 2:

> We had two consultants and we worked really really close together for like couple of months and I also got time to do this. As I remember, like it was prioritized in the organization, to say. Like my time was theirs for a couple of months.

The project in UK on the other hand, has been implemented separately from the Nordic countries. UK has used a different RPA supplier and decided on automating processes more widely at several sites around UK. Compared to the Nordics, the RPA implementation project in the UK is noted company-wide and expectations are high according to interviewee 4.

4.2 Success and Failure Factors in Robotic Process Automation Implementation Project

To understand the cause-and-effect relationships in RPA implementation projects, interviewees were asked for their opinion on the success of the RPA project and were then asked to identify factors that they felt enabling and restraining the success of the project. Interviewees were also requested to explain why these factors had a positive or negative impact on the outcome. This section discusses the success and failure factors occurred. In the analysis of the interviews, recurring themes were identified, and factors were categorized into them. The following chapters 4.2.1-4.2.6 introduce more specifically all relevant themes based on prevalence. Since the number of success factors mentioned during interviews is lower, they are discussed in one chapter 4.2.1 below.

4.2.1 Success Factors in the Implementation Project

The success factors in the interviews could be divided into four different categories: team, process and organizational related factors. Factors contributing to the success of the project were mentioned in six of the eight interviews.

In the first category, related to the team, interviewees 1, 3, 4 and 6 brought out engaged employees in the project. According to interviewee 1, the general attitude of the team towards reform and enthusiasm for identifying new development targets has helped the project:

> I think that the approach from the team is very good. Everybody is eager to look forward and develop things and are really helpful to get our department to get developed in any kind of way. So, they are testing things without complaining and understand the benefits of this development.

Interviewees 3 and 4 had also experiences of the support and enthusiasm of the team as an enabling factor for project success. Interviewee 6 stated that the operational team in Finland has facilitated the progress of the project by doing their own part and offering help when needed:

> Well people are committed to this in a way that we have always made sure in meetings, that we have done our part, and if any extra help is needed then we have always offered it and tried to be open minded about this project.

The second category was identified as process related. Interviewees 3 and 5 felt that the right processes had been chosen for automation and that automating the invoice process would enable the organization to reap many benefits, such as time saving and headcount.

In the last category, organizational, there was one success factor mentioned: involving IT. According to the interviewee 3, the difference of the pilot project in Sweden as compared to the projects in Finland and Denmark was that IT was included in the latter projects from the beginning:

> In Finland and Denmark, we had our own IT involved early. —— Now, even though we have had a lot of issues, we still felt that IT was very much involved and felt an ownership of the project, which they didn't do, when we did it in Sweden.

4.2.2 Organizational Issues

The most prominent factors in the interviews were identified as organization related factors that emerged in each of the interviews. Organizational structures, especially the siloed Information Technology department, rose in six of the eight interviews as an obstacle to success in RPA projects.

Siloed IT is perceived in the slowness and difficulty of decision-making, as well as in getting help with IT problems in general. Interviewee 4 stated that the decision making is very layered and when applying for approvals for Information Technology projects, decision-making is always passed on to a higher party. According to interviewee 1, the same problem is seen when seeking for help for IT problems, since IT department is not well structured:

> It feels like the departments in IT don't know what the other departments do, so it's a lot of steps and lots of departments doing different things in all cases. That makes it very frustrating when you just want to have a one IT person to ask, but it's just a lot of people doing different things.

Interviewee 3 supported this, by stating that finding the right people to get help with problems that occurred during the project was challenging. Interviewee 4 thought that the reason for this is that the IT department is under resourced:

> I think that they [IT department] are very under resourced with the amount of work that need to be done. — — So, I think that there need to be investments not only in projects like RPA, but investments in the resource of IT. Not the capability, cause they are amazingly capable, they just don't have the capacity.

Another reason for the problems that were experienced with the cooperation of IT departments, was not involving the IT from the beginning of the RPA project. Interviewee 1 and 2 mentioned, that IT should have been involved earlier than it was. Also, interviewee 3 felt that not involving IT from the beginning led to issues:

> Because in Sweden we said that it's for us to move the project ahead, let's leave IT out as long as we can, which made it very very painful when they realized they had not been in board from the start. So, they were not really helping us solving the issue.

Not involving the operational team in all phases of the project was also perceived as a failure factor in some of the interviews. According to interviewee 6, the operational team in Finland was completely lacking a comprehensive understanding of the project and its flow. Interviewee 8 stated, that the first go-live of RPA had not been informed to the operational team at all:

> In December when it went wrong [go-live], I didn't even know that the robot was invoicing. No one had bothered to tell me about it until I realized that there are more than hundred invoices appeared.

One of the organizational factors that came up frequently was justification for the need for Robotic Process Automation. Interviewee 6 felt that there was no need for RPA in Finland and an attempt has been made to come up with a need during the project. The interviewees' 7 and 8 experience of implementing RPA in Finland was that the benefit is so narrow that the time spent on the project is many times higher.

In Finland, not prioritizing the project was also perceived as a failure factor by interviewees. Interviewee 6 argued that since the project has not been prioritized, it has caused frustration inside the project team. According to interviewee 7, the lack of prioritization caused the interest of operational team to cease:

> If the process owners would had more time to put in this, if for example two or three weeks we had been doing this [project] almost every day and reviewed that stuff, it wouldn't have prolonged like that. Then really that interest would have lasted much longer or better.

In addition, project management was perceived as lacking in Finland by interviewees. Interviewee 6 mentioned that there has been a complete lack of a manager in the project. The view of interviewee 8 supports this:

> This has not been led by anyone, so I think that this has been a complete chaos.

4.2.3 Communication Issues

The second most occurring category in failure factors was communication issues. Both internal and external communication issues emerged in several interviews. According to interviewee 1, there are problems in internal communication between different departments, which makes the flow of projects more difficult. Interviewee 3 felt that the internal communication had failed due to the lack of regular meetings:

> So, communication is always difficult, because I thought, when I heard everything was good from one side [the supplier], that the other side was fine as well [the operational team]. And I have only raised things when I have heard that it's not going in the right direction. — — Lessons learnt, we should have had weekly meetings where I got the other side's opinion as well.

Interviewee 6 experienced that communication had failed because not all persons concerned were involved from the beginning:

> Communication did not work here at first. It was because this small project team was split into two different teams who didn't communicate with each other. And when there was no project leader, the leader did not communicate to these both sides. — — But it doesn't make it blissful, since the communication inside the team has to be good too.

In addition, interviewee 8 emphasized the lack of communication and information sharing in the RPA implementation project:

> Someone must have all the strings in their hands and the knowledge of what is happening and where it's happening. And that someone informs those involved about the situation. In my opinion, that is the biggest lack that there has been.

External communication both from the supplier to the organization and vice versa was also perceived as a failure factor. According to interviewee 5, communication from the supplier was insufficient:

> We said it [the project] had to be paused for the year end close and we would continue after the new year. And then it was paused, and we didn't hear anything until like February or something like that. They [the supplier] thought everything was working perfectly, even though it wasn't still running. We had no communication with them.

Interviewee 6, on the other hand, felt that the supplier did not communicate about the progress of the project:

> Although in a meeting we specifically said to the supplier to let us know if anything is done in live environment. Then something had been done there and test orders had

> been put in the live environment and in the morning the operational team noticed that this had happened. It was only when we asked, that we received a message from the supplier that they had been testing it so late that they thought they would communicate us about it in the morning.

According to the interviewee 8, the communication of the supplier was not open and honest:

> The supplier team disappeared at that point when things went wrong, and they tried until the last minute to claim they didn't do anything. So that's one thing. If you fail like that, then you can say it openly and not so, that you have to start looking for evidence.

Also, interviewee 8 felt that communication did not work seamlessly from the organization to the supplier:

> At some point, some persons didn't care to reply when questions were asked, so in a way the supplier did not get the information they needed fast enough.

4.2.4 Supplier Related Issues

The supplier was recurring theme when reviewing the failure factors in the RPA implementation project. Supplier related issues were mentioned in five out of the eight interviews and communication issues from the supplier to the organization, that were discussed previously in chapter 4.2.3, was one of the emerged ones. In addition, a sudden change of the project team of the supplier was perceived as causing problems by interviewees 5, 6 and 7. According to the interviewees 5, 6 and 7, in both Denmark and Finland, the team of the supplier switched during the project. According to the interviewee 5, the communication problems were due to the change of the team. Interviewee 6 felt that the project had progressed well until the change and that the supplier failed in the handover:

> In my opinion, as long as we were doing the defining [of RPA] it went well. It was at the point where it was the first team of the supplier. They had some kind of understanding about robotics. But when the team changed, the handover didn't go well.

Interviewee 7 experienced, that the change of the team of the supplier caused additional work for the operational team. The previous team of the supplier had not communicated the current situation at the time to the new team and this caused a situation where the definition and description of the processes had to be done again.

The interviewees also expressed their dissatisfaction with the negligence of the supplier during the development of RPA solution. All interviewees 6, 7 and 8 in Finland felt that negligence had slowed down the flow of the project.

4.2.5 Information Technology Issues

Another failure factor in the implementation project that was mentioned several times, was the internal IT environment. The overall experience of five of the eight interviewees was that the IT environment in the organization is outdated and does not support modern technological solutions. According to interviewee 1, problems with systems have also caused problems for the operation of the RPA:

> We have system issues that make the robotics not functioning. So, when we implemented the system and the invoices didn't come out, our organization was like: "oh, this is a bad robotic situation". But it wasn't the robotics, it was our own systems. That's why it wasn't working.

Interviewee 2 mentioned as a failure factor the unstable Enterprise Resource Planning systems and interviewee 3 in turn stated, that the IT environment is sensitive, causing connectivity issues for RPA:

> But the pain points, if I would say. We have a quite sensitive IT environment overall at the organization, so like VPN connections and things like that. I know that in Sweden we struggled with that [VPN] when we went live. The robot lost connection quite often.

According to interviewee 4, the IT environment has complicated the development of the RPA solution:

> I think that because of the way our systems are structured, we have so many different independent systems, it has been very difficult to pull this [RPA] together.

Interviewee 6 also pointed out that there were difficulties in the development phase due to the test environment of ERP system not matching the live ERP system. This slowed down the development and caused erroneous invoices to be sent to customers.

4.3 Impacts After the Implementation of Robotic Process Automation

To examine the success of the implementation project, the interviewees were asked about the impacts experienced after the implementation of Robotic Process Automation. This section discusses the implications identified in the interviews after the implementation of Robotic Process Automation. This question was presented only to interviewees in units, where deployment of RPA had already been done at the time of the interview. The impacts mentioned by interviewees were divided into two categories: benefits and challenges.

All three interviewees had experienced benefits after the implementation of RPA and a total of 4 benefits were mentioned. Time saving was most common benefit and was mentioned in all three interviews. According to interviewee 2, about a half of manual daily tasks disappeared:

> It was successful that like 50 % of my daily work went away and that was basically like manual controls, short commands and really really simple type of work. So, I got more time to do other things and improve other things. Do other things that are more important than just typing some short command and doing some manual checking and so.

Another benefit that emerged was the reduction of errors. According to interviewee 1, there used to be human errors in manual invoicing, when order handlers forgot to block invoicing for partially delivered orders, even though invoicing should have happened only after all items had been delivered.

According to interviewee 1, the time saving, and reduction of errors have also led to a better customer satisfaction. Interviewee 2 also mentioned that robots do not depend on humans to work:

> They are more sustain than people. Like if I´m gone one day there is RPA solution still working.

In addition, all three interviewees had experienced one challenge after the implementation of Robotic Process Automation. All interviewees 1, 2 and 3 felt that the biggest challenge was related to the ERP system misfunctioning, which also caused problems for the operation of RPA, creating extra manual work for employees.

4.4 Key Success Factors in Robotic Process Automation Projects

The purpose of the research is to gain an understanding of the Critical Success Factors in RPA projects. To identify CSFs, interviewees were asked to share their views on key success factors in RPA projects and to prioritize them. A total of 14 success factors emerged in the interviews, which were divided into three different categories: organizational factors, team factors, process factors and communication factors.

4.4.1 Organizational Key Success Factors

Organizational factors emerged utmost in the interviews. All eight interviewees mentioned at least one and project management was emerged most often. Project management was also perceived as the most important success factor in Robotic Process Automation project. Several means of project management were highlighted, and for example, having a project manager and monitoring the project were considered important according to interviewee 6:

> I think there are two highly important factors. It is that someone leads it and that someone follows it.

Schedule was emphasized as important for project success in multiple interviews. Interviewee 5 thought that a schedule should be set for testing and interviewee 7 suggested, that projects will be more successful if they have a more urgent schedule. Interviewee 8, in turn, stressed the importance of planning a schedule in advance:

> And the schedules should be agreed. Like for example now you'll do programming for two weeks and then we'll check what is going on. And not in the way that: "Here's an invitation to a meeting today".

In addition to the schedules, the prioritization of the project was considered as a key factor. According to interviewee 7, prioritization would help team motivation and interest towards the project. Pushing new projects over an existing workload was perceived as challenging and unpleasant.

Also, as an important success factor in the organizational category, was involving IT department. According to interviewee 4, both business and IT are always important in IT projects and involving them is the key. Interviewee 2 felt that dedicated IT person would help the project and according to interviewee 4, leaving IT out of the planning and developing, will end with missing needed access rights for RPA when using external supplier.

4.4.2 Team Related Key Success Factors

Another category perceived to be important for success, was team factors and especially engagement of the team. Two out of the eight interviewees considered engaging the team to be the most important factor. According to interviewee 1, having engaged people contributes a lot to the success:

> It's the very dedicated people in the project. They are very engaged to develop and to use the possibilities on doing the daily work better. It's the very eager people, they are a lot for the success.

According to interviewee 3, getting process owners on board is important for success, for without their support, problems could arise later as the project progresses:

> To get the process experts on board. Because if they are against it or are afraid of losing their job, they will not help out in the process. —— But I think that without having process experts on board, I don't think it will be successful. Because then the one that is developing it will not get the right support and you will not have the right people helping out if you come up with problems later on. So, I think that is the most important one.

4.4.3 Process Related Key Success Factors

The characteristics associated with the process to be automated and process knowledge were also perceived as a key success factor in RPA projects. Four of the eight interviewees stressed the importance of the processes, their maturity and optimization. Interviewee 2 argued that processes should be investigated with time and improve them before automating. Interviewee 3 agreed:

> When you identify the processes, take the time not to just copy exactly what you are doing today. Take the time to go back and say: "ok are these steps necessary?". Do Continuous Improvement workshop before to make sure you are not copying steps which you could actually take out from the current process and make it as lean as possible before copying it over to a robot.

Interviewee 5 believes that RPA cannot work if the process is not clear and defined. Therefore, process optimization and maturity are key factors. Also, interviewee 7 stressed that simplifying processes is needed.

4.4.4 Communicative Key Success Factors

The last category that emerged when talking about key success factors, was factors related to communication. During the implementation project of RPA, the interviewees had experienced challenges in both internal and external communication and communication was highlighted in four of the eight interviews as a key success factor.

Communication was not considered as the most important factor, but it was nonetheless perceived as a key factor for success. Interviewees 2, 5, 6 and 8 mentioned communication as one of the key factors.

4.5 Future Prospects of Robotic Process Automation

The opinions of the interviewees about the future prospects of Robotic Process Automation in the organization were examined in order to determine whether the success or failure of the project affected the perceptions of the interviewees about the potentiality of RPA as part of process management and improvement.

Despite some of the case organization's units did face failures in the implementation project of RPA and felt the implementation was not successful, the overall consensus in the interviews is, that RPA is something that the organization would benefit from in the future in a large scale. According to interviewees 6 and 8, the potential of RPA would be in some processes other than invoicing, such as updating the order backlog and checking purchase invoices. Interviewee 5 thought that the organization now started small and that extending RPA to other processes would be beneficial in the future.

According to interviewee 3, RPA is an important tool for the organization since its IT environment is old and branched:

> Yeah, as long as we don't have a fully integrated IT environment. If we would've been a new starting company with like 15 employees, we would not probably need a robot, because then we would make sure that our ERP system is connected to our CRM system and our warehouse system and everything. But here as we are an old company with very nonintegrated IT environment, and I don't see that happening within at least coming 5 years, I think. Until we are there, I think the robot definitely would make sense.

According to interviewee 4, the benefits of RPA are so great that its utilization will be a gamechanger for the case organization:

> If I´m going to be honest, I think it's going to be a gamechanger. Because it will make us quicker, it will make us more accurate, but it will also put more hours for focused on the customer and speaking for the customers directly. — — I think what this will allow us to do, is for to develop those teams, get more time on training, getting more affecting on the course of customers, but just spending more time with customer while not worrying about manual processes. It's going to be a gamechanger. The amount of hours to be saved, more efficient we will become. It will be massive.

5 DISCUSSION

In this section, a discussion of the results is presented. The first chapter 5.1 reviews the main results and findings of the research through both the theoretical and empirical part. In the following chapter, reliability, validity and limitations of the research are discussed and lastly, in chapter 5.3 possible topics for further research are presented.

5.1 Implications

The primary purpose of this research was to achieve a broader understanding of the Critical Success Factors in Robotic Process Automation implementation project in a large-scale organization. The research sought to answer the following research question:

- *What are the Critical Success Factors in Robotic Process Automation implementation project in a large-scale organization?*

The research question was sought to be answered through theoretical and empirical part. To elucidate the theoretical background, a literature review was conducted utilizing existing research on Robotic Process Automation and its implementation, together with Critical Success Factors in RPA projects. The empirical part was conducted as a qualitative case study examining the implementation of RPA by a large-scale organization in 4 units. The aim was to clarify the differences between implementation projects between units, as well as the cause-and-effect relationship of these factors to project success, forming an understanding of the Critical Success Factors.

The findings from the literature review suggested that in order to the implementation of RPA to be successful, three key steps should be fulfilled: identifying suitable processes, optimizing robots, reviewing and maintaining (Alberth and Mattern, 2017; Geyer-Klingeberg et al., 2018; Willcocks, Lacity & Craig, 2017). Implementation also requires a clear need for improvement (Alberth & Mattern, 2017) and process optimization (Gadre, Jessel & Gulati, 2017) together with justification of the need for employees (Wright et al., 2018). According to the interviews, process optimization was done in Sweden and UK thoroughly, but not in Finland and Denmark. Instead the processes were copied from Sweden and the real need for automation was not investigated nor the selected processes evaluated. Based on the interviews, the benefit in Finland was found to be narrow, and the operational team had no understanding of the need and benefits of Robotic Process Automation. This supports the findings of literature review, since in Sweden, the project was considered a success, but in Finland and Denmark the implementation had not yet been completed at the time of the research, despite several attempts, and there was no certainty that it would be successfully completed in the future.

In the literature review, typical factors behind unsuccessful RPA implementation were defined as inapplicable process, lack of terminology understanding, imbalance between IT and business, unrealistic RoI expectations, lack of maintenance and social impact. It was stated, that not setting goals, sharing responsibilities or having clear communication and continuous maintenance leads to failure. The findings from interviews supports these conclusions as the failure of implementation projects in Finland and Denmark were mainly due to not involving the operational team, not having a justification for the need for RPA, not prioritizing the project, not having a project manager, poor communication both internally and externally, supplier related issues and having outdated test environment of the ERP system.

In the theoretical section, the Critical Success Factors previously defined were the CSFs by Sudhakar (2012) for software projects, which were divided into seven categories: communication factors, team factors, organizational factors, technical factors, environmental factors, product factors and project management factors CSFs for RPA in an organization, CSFs for RPA development and CSFs for RPA operations. Under the categories, 32 Critical Success Factors had been identified. In the empirical part, the success factors of the RPA implementation project of the case organization were investigated, as well as the views of the interviewees generally on Critical Success Factors in RPA projects. Success factors in the implementation project were identified in three categories: team, process and organizational, which supports the CSFs by Sudhakar (2012). The most important Critical Success Factors emerged in the interviews were project management, involving right people, prioritizing the project, communication, process optimization and maturity and project team engagement. When comparing to the findings of the literature review, it can be concluded that the Critical Success Factors identified largely correspond to the CSFs by Plattfaut et. al. (2022) and CSFs by Sudhakar (2012), broadening the views with the project team engagement. Association of the empirical findings and literature are presented in the table below (Table 5).

TABLE 5 Association of the Empirical Findings and Literature

Critical Success Factor	**Empirical Research**	**CSF by Plattfaut et. al. (2022)**	**CSF by Sudhakar (2012)**
Project management	- Having a project manager - Monitoring the project - Having a schedule		- Leadership - Project control mechanisms - Project schedule - Project manager's competence
Involving right people	- Involving IT from the beginning - Involving business from the beginning	- Involve operational and IT staff early	
Prioritizing the project	- Prioritizing time for the project team dedicated to the project	- Ensure sufficient resources and priority of tasks	
Communication	- Internal communication - External communication	- Carefully manage the internal communication and staff redeployment	- Communication in project - Relationship between users and developers
Process optimization and maturity	- Investigating and improving processes	- Select and strategically develop processes according to established criteria	
Project team engagement	- Engaging the project team to support the project		

This research expanded the current understanding of the research topic of Critical Success Factors for Robotic Process Automation implementation projects. However, due to the nature and scope of the research, the topic requires more extensive research in the future. Reliability, validity and limitations of this research are discussed in the next chapter.

5.2 Reliability, Validity and Limitations of the Research

To assure the reliability and validity of the research Morse, Barrett, Mayan, Olson and Spiers (2002) suggest that verification of the research should be practiced in all stages of the research. Methodological coherence i.e. selecting a research method suitable for the research problem, is one of the important verification strategies. The method and the research question live with the research process and can change (Morse et al., 2002). In this research, the research problem and case organization were observed from the beginning of the RPA project in Finland and Denmark, and the final research question was formulated by the need of the prevailing environment and research gap. The reliability of the research was ensured by using a suitable research method, choosing relevant interviewees and by performing data collection and analysis simultaneously. In order to ensure reliability and validity, the progress of the research has been described in detail.

When examining the research, the limitations regarding it should also be taken into account. Limitations of the research can be identified in both the theoretical and empirical parts. Peer-reviewed literature was used to map the theoretical background, but the existing research on the Critical Success Factors of Robotic Process Automation projects is still relatively limited. Within the framework of the nature and resources of the research, it can also be stated that the implementation of extensive research is limited.

On the other hand, in the empirical part, the limitations can be considered to be mainly related to the limitation of the research to one organization, limiting generalizability. However, similarities with the theoretical background can be identified in the research results. The limited experience of the interviewees in RPA projects can also be considered a limitation, as this project was the first of its kind for all the interviewees. Identifying key success factors based on one project can be narrow.

In addition, the relationship of the researcher with the case organization can be considered as a limitation. Researcher works at the case organization and knows some of the interviewees personally and the characteristic of semi structured interviews being conversational, it may affect the interviewees on the other hand positively and on the other negatively. Positively, as the interview situation can be more relaxed and open and negatively, since when the researcher is an internal employee of the organization, not all grievances may be dared to be relieved. When the researcher herself performs the data collection and analysis, the possibility of human errors in the interpretation of the data must also be taken into account.

5.3 Further Research

As Robotic Process Automation is a relatively recent phenomenon, but nevertheless a technology that is increasingly being used, it is necessary to further study it from different perspectives. Based on this research, the Critical Success Factors in Robotic Process Automation projects require further research, for example in the form of case studies in different contexts. Existing empirical research are lacking, and generalization of CSFs of RPA projects would require more research.

This research focused on the Critical Success Factors in Robotic Process Automation in large organization. Based on this research, the existing research generally focuses on the implementation of RPA without addressing it regardless of the size of organizations. An interesting topic would be to study the effects between the size of the organization and the benefits and challenges of RPA. Do the perceived benefits and challenges change according to the size of the organization or how do the Critical Success Factors differ in small and large organizations?

Considering the future research and development of Robotic Process Automation, an interesting research topic would also be the utilization of Artificial Intelligence and machine learning in RPA. There is some related existing research around the research are of intelligent RPA (e.g. Herm, Janiesch, Reijers & Seubert, 2021), but there is still a lack with the full potential it could offer. As stated in the theoretical part, the use of AI and machine learning in RPA brings more opportunities for RPA to be implemented to other than only repetitive and routine-like tasks.

6 CONCLUSION

As a lightweight IT, Robotic Process Automation (RPA) provides organizations an efficient and accessible automation technology for repetitive, routine-like and low cognitive abilities requiring processes. RPA is faster, more error-free and productive than a human, which together with easy implementation has led to its popularity to increasing of utilization in the process improvement of organizations. In order to achieve the benefits, the successful implementation of RPA and the factors leading to it are important for organizations. As RPA is a rather recent phenomenon, there is relatively little research on it, and the literature found on the success factors in RPA implementation projects is especially narrow. The aim of this research was to create an understanding of the factors that lead to the successful implementation of Robotic Process Automation in large organizations. The research answered the question: What are the Critical Success Factors in Robotic Process Automation implementation project in a large-scale organization? This research was conducted as a qualitative case study and consisted of two main sections: the theoretical part and the empirical part.

The literature review explored the implementation possibilities and challenges of Robotic Process Automation, as well as the factors leading to successful implementation. With the help of literature, an understanding of Critical Success Factors in RPA implementation projects was created, which served as a basis for the empirical section. Identified key steps for the implementation of RPA were identifying suitable processes, developing the robots and reviewing and maintaining the results. Suitable processes can be defined by process´ characteristics describing the maturity of the process. The eight most significant characteristics were identified: frequency, use of numerous systems, constancy, minor need for cognitive thinking, describable unambiguously, occurring human errors, standardized and clear cost structure. In addition to process maturity i.e. process being inapplicable, five other factors were discovered as negatively affecting the implementation: lack of terminology understanding, imbalance between IT and business, unrealistic RoI expectations, lack of maintenance and social impact.

Critical Success Factors in previous research have a focus more generally on software projects and the seven most important categories are: communication factors, team factors, organizational factors, technical factors, environmental factors, product factors and project management factors. 32 Critical Success Factors specifically in Robotic Process Automation implementation projects were found in the literature and categorized as Critical Success Factors in RPA in an organization, RPA development and RPA operations.

In the empirical part, qualitative case study was conducted in the form of semi-structured interviews. The assigning organization was a large globally operating water technology company, where Robotic Process Automation has been implemented in the sales invoicing process in four separate units starting from 2018. The objective of the empirical section was to strengthen and expand the understanding presented in the previous research on Critical Success Factors in

RPA implementation project from the perspective of a large organization. In the interviews, six Critical Success Factors were identified: project management, involving right people, prioritizing the project, communication, process optimization and maturity and project team engagement. From the identified CSFs, five corresponds to the findings from literature review of the CSFs by Sudhakar (2012) in Software projects and the CSFs by Plattfaut et. al. (2022) in Robotic Process Automation projects. The findings in the empirical section extend previous research knowledge with one Critical Success Factor: project team engagement.

The results of the research support previous research on Robotic Process Automation implementation projects and supplement research information on the Critical Success Factors in Robotic Process Automation implementation projects. Since the purpose of the research was to examine Critical Success Factors from the perspective of a large organization and the empirical part has been conducted as a qualitative case study within one organization, the topic requires further research to increase the generalizability. The results of the study can be utilized as a tool in the Robotic Process Automation implementation projects, but the limitations of the research should be considered.

REFERENCES

Aguilar-Savén, R. S. (2004). Business process modelling: Review and framework. *International Journal of production economics*, *90*(2), 129-149.

Aguirre, S., & Rodriguez, A. (2017). Automation of a business process using robotic process automation (RPA): A case study. *Communications in Computer and Information Science*, *742*.

Ahimbisibwe, A., Cavana, R. Y., & Daellenbach, U. (2015). A contingency fit model of critical success factors for software development projects: A comparison of agile and traditional plan-based methodologies. *Journal of Enterprise Information Management*.

Alberth, M., & Mattern, M. I. C. H. A. E. L. (2017). Understanding robotic process automation (RPA). *Journal of Financial Transformation*, *46*, 54-61.

Anagnoste, S. (2017, July). Robotic Automation Process-The next major revolution in terms of back office operations improvement. In *Proceedings of the International Conference on Business Excellence* (Vol. 11, No. 1, pp. 676-686). Sciendo.

Anderson, R. (2007). Thematic content analysis (TCA). *Descriptive presentation of qualitative data*, 1-4.

Asatiani, A., & Penttinen, E. (2016). Turning robotic process automation into commercial success–Case OpusCapita. *Journal of Information Technology Teaching Cases*, *6(2),* 67-74.

Asatiani, A., Penttinen, E., Rinta-Kahila, T., & Salovaara, A. (2019). Organizational implementation of intelligent automation as distributed cognition: six recommendations for managers.

Asquith, A., & Horsman, G. (2019). Let the robots do it!–Taking a look at Robotic Process Automation and its potential application in digital forensics. *Forensic Science International: Reports*, *1*, 100007.

Atkinson R. (1999). Project management: cost, time and quality, two best guesses and a phenomenon, it's time to accept other success criteria. *International Journal of Project Management, 17(6),* 337–42.

Beers, A., Heijnsdijk, R. & Dalen, C. (2018) Understanding the challenge of implementing your virtual workforce – Robotic process automation as part of a new social-technological paradigm. Deloitte.

Benbasat, I., Goldstein, D. K. & Mead, M. (1987). The Case Research Strategy in Studies of Information Systems. MIS Quarterly, 11(3), 369.

Bullen, C. V., & Rockart, J. F. (1981). A primer on critical success factors.

Bygstad, B. (2015). The coming of lightweight IT.

Bygstad, B. (2017). Generative innovation: a comparison of lightweight and heavyweight IT. *Journal of Information Technology*, *32*(2), 180-193.

Cewe, C., Koch, D. & Mertens, R. (2017, September). Minimal effort requirements engineering for robotic process automation with test driven development and screen recording. In *International Conference on Business Process Management*, 642-648.

Commission of the European Community (2021), "International Trade in Goods – a Satistical Picture", Eurostat (2021). Searched 8.7.2022 from: https://ec.europa.eu/eurostat/statisticsexplained/index.php?title=International_trade_in_goods_-_a_statistical_picture

Denagama Vitharanage, I. M., Bandara, W., Syed, R., & Toman, D. (2020, June). An empirically supported conceptualisation of robotic process automation (RPA) benefits. In *Proceedings of the 28th European Conference on Information Systems (ECIS2020)*. Association for Information Systems.

Dumas, M., La Rosa, M., Mendling, J., & Reijers, H. A. (2013). *Fundamentals of business process management* (Vol. 1, p. 2). Heidelberg: Springer.

Dumas, M., La Rosa, M., Mendling, J. & Reijers, H. A. (2018). *Fundamentals of Business Process Management* (2nd ed. 2018.). Springer Berlin Heidelberg

Feagin, J. R., Orum, A. M., & Sjoberg, G. (Eds.). (1991). *A case for the case study*. UNC Press Books.

Fernandez, D., & Aman, A. (2018). Impacts of robotic process automation on global accounting services. *Asian Journal of Accounting and Governance*, *9*(1), 127-140.

Fersht, P., & Slaby, J. R. (2012). Robotic Automation Emerges as a Threat to Traditional Low-Cost Outsourcing. *Horses for Sources, London*.

Freeman, M., & Beale, P. (1992). Measuring project success. Project Management Institute.

Fung, H. P. (2014). Criteria, use cases and effects of information technology process automation (ITPA). *Advances in Robotics & Automation*, *3*.

Gadre, A., Jessel, B., & Gulati, K. (2017). Rethinking robotics? Take a step back. *Journal of Financial Transformation*, *46*, 34-45.

Gartner (2021). Gartner IT Glossary. Business Process Automation (BPA). Searched 25.10.2021 from: https://www.gartner.com/en/information-technology/glossary/bpabusiness-process-automation

Geyer-Klingeberg, J., Nakladal, J., Baldauf, F., & Veit, F. (2018). Process Mining and Robotic Process Automation: A Perfect Match. In *BPM (Dissertation/Demos/Industry)*, 124-131.

Geyr, J. (2015) 'Adopting robotic process automation requires initiative from workforce and leadership alike' in Industrial Maintenance & Plant Operation 10/2015. Rockaway, New Jersey, the United States. Advantage Business Media.

Glesne, C., & Peshkin. (1992). *Becoming qualitative researchers: An introduction*. White Plains, NY: Longman.

Guo, J. X. (2019). Measuring information system project success through a software-assisted qualitative content analysis. *Information technology and Libraries*, *38*(1), 53-70.

Güner, E. O., Han, S., & Juell-Skielse, G. (2020). Robotic Process Automation as Routine Capability: A Literature Review. In *The 28th European Conference on Information Systems (ECIS), An Online AIS Conference, June 15-17, 2020*. Association for Information Systems.

Hallikainen, P., Bekkhus, R., & Pan, S. L. (2018). How OpusCapita Used Internal RPA Capabilities to Offer Services to Clients. *MIS Quarterly Executive*, *17*(1).

Hammer, M. (2015). What is business process management?. In Handbook on business process management 1 (pp. 3-16). Springer, Berlin, Heidelberg.

Herm, L. V., Janiesch, C., Reijers, H. A., & Seubert, F. (2021, September). From symbolic RPA to intelligent RPA: challenges for developing and operating intelligent software robots. In *International Conference on Business Process Management* (pp. 289-305). Springer, Cham.

Hirsjärvi, S. & Hurme, H. (2008). *Tutkimushaastattelu: Teemahaastattelun teoria ja käytäntö*. Gaudeamus Helsinki University Press.

Hirsjärvi, S., Remes, P. & Sajavaara, P. (2004). Tutki ja kirjoita (10. uudistettu painos). Helsinki. Tammi.

Hofmann, P., Samp, C., & Urbach, N. (2020). Robotic process automation. *Electronic Markets*, *30*(1), 99-106.

Kaarlejärvi, S. & Salminen, T. (2018). Älykäs taloushallinto: automaation aika. Helsinki: Alma Talent Oy.

Kaelble, S. (2018). Robotic Process Automation For Dummies, NICE Special Edition.

Kanakov, F., & Prokhorov, I. (2020). Research and development of software robots for automating business processes of a commercial bank. *Procedia Computer Science*, *169*, 337-341.

Koch, J., Trampler, M., Kregel, I., & Coners, A. (2020). 'MIRROR, MIRROR, ON THE WALL': ROBOTIC PROCESS AUTOMATION IN THE PUBLIC SECTOR USING A DIGITAL TWIN.

Kokina, J., & Blanchette, S. (2019). Early evidence of digital labor in accounting: Innovation with Robotic Process Automation. *International Journal of Accounting Information Systems*, *35*, 100431.

Kokina, J., Gilleran, R., Blanchette, S., & Stoddard, D. (2021). Accountant as digital innovator: Roles and competencies in the age of automation. *Accounting Horizons*, *35*(1), 153-184.

Kroll, C., Bujak, A., Darius, V., Enders, W. & Esser, M. (2016) Robotic process automation – Robots conquer business processes in back offices. Capgemini Consulting and Capgemini Business Services.

Lacity, M., Willcocks, L. P., & Craig, A. (2015). Robotic process automation at Telefonica O2.

Lacity, M., Willcocks, L., & Whitley, E. (2016). Service automation: robots and the future of work.

Lahti, S. & Salminen, T. (2014). Digitaalinen taloushallinto. Helsinki: Sanoma Pro Oy.

Lande, M., Shrivastava, R. L., & Seth, D. (2016). Critical success factors for Lean Six Sigma in SMEs (small and medium enterprises). *The TQM Journal*.

Le Clair, C., Cullen, A., & King, M. (2017). The Forrester Wave™: Robotic Process Automation, Q1 2017. *Forrester Research*.

Leopold, H., van der Aa, H., & Reijers, H. A. (2018). Identifying candidate tasks for robotic process automation in textual process descriptions. In *Enterprise, business-process and information systems modeling*, 67-81.

Liu, L. C., & Horowitz, E. (1989). A formal model for software project management. IEEE Transactions on Software Engineering, (10), 1280-1293.

Madakam, S., Holmukhe, R. M., & Jaiswal, D. K. (2019). The future digital work force: robotic process automation (RPA). *JISTEM-Journal of Information Systems and Technology Management*, *16*.

Moffitt, K. C., Rozario, A. M., & Vasarhelyi, M. A. (2018). Robotic process automation for auditing. *Journal of emerging technologies in accounting*, *15*(1), 1-10.

Mohapatra, S. (2009). *Business process automation*. PHI Learning Pvt. Ltd.

Morse, J. M., Barrett, M., Mayan, M., Olson, K., & Spiers, J. (2002). Verification strategies for establishing reliability and validity in qualitative research. *International journal of qualitative methods*, *1*(2), 13-22.

Munns, A. K., & Bjeirmi, B. F. (1996). The role of project management in achieving project success. International journal of project management, 14(2), 81-87

Müller, R., & Jugdev, K. (2012). Critical success factors in projects: Pinto, Slevin, and Prescott–the elucidation of project success. *International journal of managing projects in business*.

Nelson, C. (2017) Robotic process automation readiness – Three change management questions for business leaders. Information Services Group.

Niazi, M. (2015). A comparative study of software process improvement implementation success factors. *Journal of Software: Evolution and Process*, *27*(9), 700-722.

Osmundsen, K., Iden, J., & Bygstad, B. (2019, January). Organizing robotic process automation: balancing loose and tight coupling. In *Proceedings of the 52nd Hawaii international conference on system sciences*.

Penttinen, E., Kasslin, H., & Asatiani, A. (2018, June). How to choose between robotic process automation and back-end system automation?. In *European Conference on Information Systems 2018*.

Plattfaut, R., Borghoff, V., Godefroid, M., Koch, J., Trampler, M., & Coners, A. (2022). The Critical Success Factors for Robotic Process Automation. *Computers in Industry*, *138*, 103646.

Polak, P., Nelischer, C., Guo, H., & Robertson, D. C. (2020). "Intelligent" finance and treasury management: what we can expect. *AI & SOCIETY*, *35*(3), 715-726.

Ranerup, A., & Henriksen, H. Z. (2019). Value positions viewed through the lens of automated decision-making: The case of social services. *Government Information Quarterly*, *36*(4), 101377.

Ratia, M., Myllärniemi, J., & Helander, N. (2018, October). Robotic process automation-creating value by digitalizing work in the private healthcare?. In *Proceedings of the 22nd International Academic Mindtrek Conference* (pp. 222-227).

Raza, H., Baptista, J., & Constantinides, P. (2019). Conceptualizing the Role of IS Security Compliance in Projects of Digital Transformation: Tensions and Shifts Between Prevention and Response Modes. In *ICIS*.

Rizk, Y., Bhandwalder, A., Boag, S., Chakraborti, T., Isahagian, V., Khazaeni, Y., ... & Unuvar, M. (2020). A unified conversational assistant framework for business process automation. *arXiv preprint arXiv:2001.03543*.

Rockart, J. F. (1979). Chief executives define their own data needs. Harvard business review, 57(2), 81-93.

Rodriguez-Repiso, L., Setchi, R., & Salmeron, J. L. (2007). Modelling IT projects success with fuzzy cognitive maps. Expert Systems with Applications, 32(2), 543-559.

Romao, M., Costa, J., & Costa, C. J. (2019, June). Robotic process automation: A case study in the banking industry. In *2019 14th Iberian Conference on information systems and technologies (CISTI)* (pp. 1-6). IEEE.

Rosemann, M., & vom Brocke, J. (2015). The six core elements of business process management. In *Handbook on business process management 1* (pp. 105-122). Springer, Berlin, Heidelberg.

Santos, F., Pereira, R., & Vasconcelos, J. B. (2020). Toward robotic process automation implementation: an end-to-end perspective. *Business Process Management Journal*, *26*(2). 11.11.2021: https://doi.org/10.1108/BPMJ-12-2018-0380

Schmitz, M., Dietze, C., Czarnecki, C. (2019). Enabling Digital Transformation Through Robotic Process Automation at Deutsche Telekom. In: Urbach, N., Röglinger, M. (eds) Digitalization Cases. Management for Professionals. Springer, Cham.

Schwalbe, K. (2010). Managing information technology projects. Cengage Learning.

Scheer, A. W., Abolhassan, F., Jost, W., & Kirchmer, M. (2004). *Business process automation*. Heidelberg: Springer.

Sharp, A. & McDermott, P. (2009). Workflow modeling: Tools for process improvement and applications development (2 painos). Boston: Artech House

Sidorova, A., & Isik, O. (2010). Business process research: A cross-disciplinary review. *Business Process Management Journal*, *16*(4). Searched on 16.11.2021: https://doi.org/10.1108/14637151011065928

Stople, A., Steinsund, H., Iden, J., & Bygstad, B. (2017). Lightweight IT and the IT function: experiences from robotic process automation in a Norwegian bank. *Bibsys Open Journal Systems*, *25*(1), 1-11.

Sudhakar, G. P. (2012). A model of critical success factors for software projects. *Journal of Enterprise Information Management*.

Suri, V. K., Elia, M., & van Hillegersberg, J. (2017). Software bots -The next frontier for shared services and functional excellence. *Lecture Notes in Business Information Processing*, *306*.

Syed, R., Suriadi, S., Adams, M., Bandara, W., Leemans, S. J., Ouyang, C., ter Hofstede, A. H., van de Weerd, I., Wynn, M. T & Reijers, H. A. (2020). Robotic process automation: contemporary themes and challenges. *Computers in Industry*, *115*, 103162.

Syed, R., & Wynn, M. T. (2020, September). How to trust a bot: an RPA user perspective. In *International Conference on Business Process Management* (pp. 147-160). Springer, Cham.

Tarafdar, M., Beath, C., 2018. Wipro Limited: developing a cognitive DNA. In: Proceedings of the 39th International Conference on Information Systems: Bridging the Internet of People, Data, and Things, San Francisco, California, USA.

Uskenbayeva, R., Kalpeyeva, Z., Satybaldiyeva, R., Moldagulova, A., & Kassymova, A. (2019, July). Applying of RPA in administrative processes of public administration. In *2019 IEEE 21st Conference on Business Informatics (CBI)* (Vol. 2, pp. 9-12). IEEE.

van Aken T. (1996) De weg naar project succes: Eerder via werkstijl dan instrumenten, De Tijdstroom.

Van der Aalst, W. M. (2013). Business process management: a comprehensive survey. *International Scholarly Research Notices*, *2013*.

Van der Aalst, W. M., Bichler, M., & Heinzl, A. (2018). Robotic process automation.

Westerveld, E. (2003). The Project Excellence Model®: linking success criteria and critical success factors. *International Journal of project management*, *21*(6), 411-418.

Willcocks, L. P., Lacity, M., & Craig, A. (2015). The IT function and robotic process automation.

Willcocks, L., Lacity, M., & Craig, A. (2017). Robotic process automation: strategic transformation lever for global business services?. *Journal of Information Technology Teaching Cases*, *7*(1), 17-28.

Wright, D., Witherick, D. & Gordeeva, M. (2018) The robots are ready. Are you? – Untapped advantage in your digital workforce. Deloitte.

Yin, R. K. (2003). Case study research: design and methods (ed.). Thousand Oaks.

Zairi, M. (1997). Business process management: a boundaryless approach to modern competitiveness. *Business process management journal*.

APPENDIX 1 INTERVIEW TEMPLATE

- Current role
- Time of experience in the current role
- Time of experience in total at the organization
- The role in the Robotic Process Automation project

- Describe the Robotic Process Automation implementation project at your unit from your perspective
    - What phases did the project have?

- Was the implementation of Robotic Process Automation in your unit successful in your opinion?
    - Which factors did you find successful in the implementation?
    - Which factors did you find unsuccessful in the implementation?

- What impact has Robotic Process Automation had on your unit after the implementation?
    - What benefits have you experienced?
    - What challenges have you experienced?

- Which factors would you consider to be the key factors in the overall success of (this) Robotic Process Automation project?

- Do you think that the company would benefit from implementing Robotic Process Automation in other processes in the future?