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Master's Thesis

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UTILIZATION OF ROBOTIC PROCESS AUTOMATION IN ENTERPRISE RESOURCE PLANNING

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ABSTRACT

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Organizations have started to utilize robotic process automation more on their business and many processes in enterprise resource planning systems have been or will be automatized. Since some companies do not have any experience in robotic process automation, an external IT partner is often taken into project as an implementor. The purpose of this thesis is to find out how different success factors are considered from the standpoint of implementation partner and why some projects are failing, or project outcomes are not meeting the expectations.

The theoretical part reviews the fundamentals of robotic process automation and enterprise resource planning systems, finds out utilization possibilities of robotic process automation in enterprise resource planning systems and introduces the critical success factors of robotic process automation projects. The empirical part analyzes the data collected in interviews and makes suggestions based on analysis how to improve project success level.

This thesis concludes that most important issues are correct strategy as well as partner's knowledge and capability. Customer's participation from upper management, business and IT departments is important in order to achieve the set objectives and guarantee that partner gets support for their work from customer even if the project is delivered to customer with Software as a Service model. Additionally, the ease of solution maintenance must be emphasized already in the implementation phase.

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Hakusanat: ohjelmistorobotiikka, toiminnanohjausjärjestelmä, IT-projekti, kriittiset menestystekijät

Yritykset ovat alkaneet hyödyntämään ohjelmistorobotiikkaa yhä enemmän liiketoiminnassaan, ja monia prosesseja toiminnanohjausjärjestelmissä on automatisoitu tai aiotaan automatisoida. Koska osalla yrityksistä ei ole kokemusta ohjelmistorobotiikasta, avuksi otetaan yleensä mukaan automaation toimittaja. Tämän työn tarkoituksena on selvittää miten eri menestystekijöitä tarvitsee projekteissa huomioida automaation toimittajan kannalta ja miksi osa projekteista epäonnistuu tai niiden lopputulos ei vastaa odotuksia.

Tämän tutkimuksen teoreettisessa osassa käydään läpi ohjelmistorobotiikka ja toiminnanohjausjärjestelmät käsitteenä, perehdytään ohjelmistorobotiikan käyttömahdollisuuksiin toiminnanohjausjärjestelmissä ja esitellään ohjelmistorobotiikkaprojektien kriittisiä menestystekijöitä. Empiirisessä osuudessa puolestaan analysoidaan haastatteluista kerättyä dataa ja tehdään analyysin pohjalta ehdotuksia miten parantaa projektien onnistumista.

Työn lopputulos havainnollistaa, että projekteissa tärkeintä ovat oikea strategia ja toimittajan osaaminen sekä kyvykkyys. Vaikka projekti toimitettaisiin asiakkaalle palvelumallilla, asiakkaan osallistuminen niin ylemmän johdon, liiketoiminnan kuin IT-osaston puolelta on tärkeää, jotta projektissa saavutetaan yhteiset tavoitteet ja toimittaja saa riittävän tuen työlleen. Lisäksi tuotannon ylläpidon helppouteen ja yksinkertaisuuteen pitäisi panostaa jo toteutusvaiheessa.

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Writing this thesis has not always been so easy beside my full-time job as an IT consultant. I want to thank my family, friends and co-workers for cheering and supporting me through this journey. Now it is finally time to complete the journey as a student and focus on creating new great memories in working life.

Sincerely,
Matilda Ojala
Espoo, 24.05.2019

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS AND ABBREVIATIONS

AI	Artificial Intelligence
BPM	Business Process Management
CSF	Critical Success Factor
CSS	Critical Success Strategy
ERP	Enterprise Resource Planning
IT	Information Technology
KPI	Key Performance Indicator
ML	Machine Learning
ROI	Return on Investment
RPA	Robotic Process Automation
RTA	Robotic Test Automation
SaaS	Software as a Service

1   INTRODUCTION

Robotic Process Automation (RPA) is a technology which can be utilized to automate virtually ran business processes. It is strengthening its position as an IT technology and its markets have increased recently (Aalst et al. 2018). Many companies have implemented or, at least, are interested in it. Since the technology is quite new, there are multiple open questions related to it. According to Lazarus (2018), approximately even 30 to 50 percent of initial RPA implementations are not successful and this can be explained by RPA being quite new technology and therefore automation projects may not always have a routine implementation or experienced executors.

1.1   Background

Almost all companies use enterprise resource planning (ERP) systems, and ERP integrates nowadays the core of all organizational business functions (Samaranayake, 2009). ERP systems consist of different modules, such as logistics, finance and human capital management. Technology development and heavy investments on ERPs have enabled the development and growth of huge and complex ERP entities. A single company can have multiple parallel systems. Indeed, ERPs are more useful when they are complementing other IT systems (Ruivo et al. 2017). Consequently, these factors can cause a complex situation which may require a lot of manual work daily for user since automation is not used. For example, data can be diffused between multiple human resources and cause some incoherence (Aalst et al. 2018). Additionally, even standard data entries are usually made manually. Daily users of ERPs can therefore suffer from massive manual workload, and time for decision making, strategical tasks and problem-solving can be limited (Lacity & Willcocks, 2016).

Technology advancement has also enabled the implementation of robotic process automation. It can be described as a software robot which automates processes. To

utilize RPA, the desired process for automation should include rule-based or repetitive work which is therefore prone to human errors (Aalst et al. 2018). Implementation of RPA can lead to cost and time optimization as well as productivity increase since simple and manual human work is not a necessity anymore (Lacity & Willcocks, 2016). RPA is only doing processes which are taught to it. In case of an error and expectation in the system, RPA reports it to a human employee (Aalst et al. 2018).

Since ERPs include so many manual processes, transactions or tasks, RPA could be utilized in many ERP related cases to decrease the workload of employees. For example, as financial accounting is mainly based on rules and regulations, there is only one standard way to do it. Therefore, RPA is currently implemented especially on financial area of ERP. Logistical processes, such as procurement, and human resource management are not so widely utilizing RPA as seen in Figure 1 (Samaranayake, 2009; Burnson, 2018).
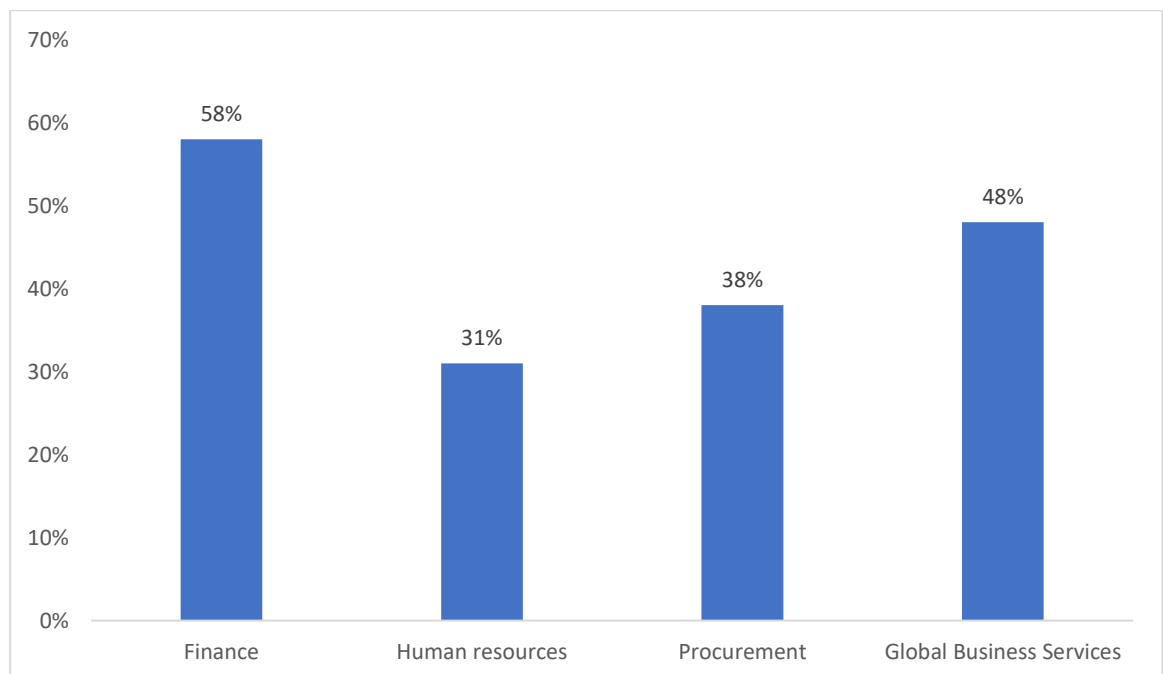

Figure 1. Ratio of Business Processes Piloting RPA in 2018 (Burnson, 2018).

As the opportunities of RPA are still kind of unclear in some modules, the critical factors and steps which help to achieve success in implementations and process

automations remain indefinite as well. All kinds of IT project elements must be evaluated, for example, technical and socio-economical, in order to create a comprehensive view of the project progression. These elements form critical success factors (CSFs) and they must be well-known for RPA consulting providers that implementations will be successful, and users are satisfied.

1.2   Research Questions

The objective of this thesis is to analyze success factors and find key elements which are crucial to RPA implementation in ERP logistic processes. Additionally, the purpose of this thesis is to provide scientific research since the area is not widely studied yet in academic publications. The academic research of RPA is important since RPA is getting more and more used in business purposes. Since the succeeding rate of RPA is only 50 to 70 percent (Lazarus, 2018), the research questions in this thesis are formed in such way that most critical points in terms of success and unsuccess are found. The research question is formed as followed

- What are the most critical success factors in RPA projects for ERP?

The aim of research question is to find the most critical success factors which are influencing most on the projects. This research question can be further divided to two sub-questions which are

- How RPA implementation partner should consider critical success factors in implementations?

- Which issues can cause project failure?

The focus of this thesis is to consider the success factors and issues on which the implementation partner can influence and how the factors can influence the project. Since the interviews are executed in an IT consulting company, the study researches only cases where companies have done the implementation together with

implementation partner and the partner has participated actively in the project. However, customer is always strong influencer in IT projects and it affects many decisions and operations, so it cannot be totally left out from this study and its decisions and actions are also noticed. Additionally, reasons for possible project failure are searched.

The thesis will only handle ERPs at general level (not products, for example, SAP). The thesis does not cover technical details of RPA. Additionally, the marketing perspective of RPA is not covered. Use of Artificial Intelligence (AI), Machine Learning (ML) and Business Process Management (BPM) in implementation projects are left out as well as outsourcing the RPA services.

1.3   Structure of the Research

This thesis is divided into six main chapters. The purposes of each chapter are presented in Table 1 with an input-output model. The literature review follows the introduction. The main purpose of literature review is to understand the concepts of enterprise resource planning and robotic process automation, as well as possible functionalities when they are connected. The chapter also introduces and explains the framework for success factors in RPA implementation. The literature search and review are made using several academic papers. However, also many unacademic resources, such as publications of IT consultant companies, are also used since RPA is not so widely researched in scientific studies. Instead, it is already used in business world and many reports originate from real business cases.

Table 1. Input-output model.

	Input	Output
Chapter 1: Introduction	Background of the study	Objectives, research questions and structure of thesis
Chapter 2: Literature Review	Concepts of robotic process automation, enterprise resource planning and critical success factors	Finding the benefits of RPA implementations in ERP and introducing success factors based on literature
Chapter 3: Research Methods	Used data collection and analysis methods	Describing the used methodology, reliability and validity of the study
Chapter 4: Results and Analysis	Interviews of four RPA professionals	Providing results and analysis of critical success factors
Chapter 5: Discussion	Most important results for overall success of project found from interviews	Assessment of results and answering research questions
Chapter 6: Conclusions	The most important outcomes of the study	Representing the main findings of thesis

Chapter 3 illustrates the used research methodology, such as data collection and data analysis methods and analyzes the reliability and validity issues of the thesis. This thesis utilizes qualitative research method – four RPA specialists in an IT consulting company are interviewed in semi-structured interview sessions. Chapter 4 presents the main interview results which are also analyzed more deeply by each success factor. Next, the results considered most important are discussed and the effects on holistic project success are evaluated. Finally, the thesis is summed up in conclusions where all major findings are highlighted.

2   LITERATURE REVIEW

Articles, books and conference papers presented in this chapter are searched from databases, mainly using SpringerLink Journals, Science Direct and Emerald Journals, the searches utilized the keywords of "enterprise resource planning", "robotic process automation" and "critical success factors", which are seen in Figure 2. A lot of ERP related publications are found but since RPA is quite new technology, it is not widely researched in academic papers and therefore, scientific material is not written much based on literature search. However, robotic process automation itself provides search results. On the other hand, enterprise resource planning together with critical success factors provides many search results in academic papers since the concept is been studied for a longer period. Therefore, robotic process automation is searched separately.
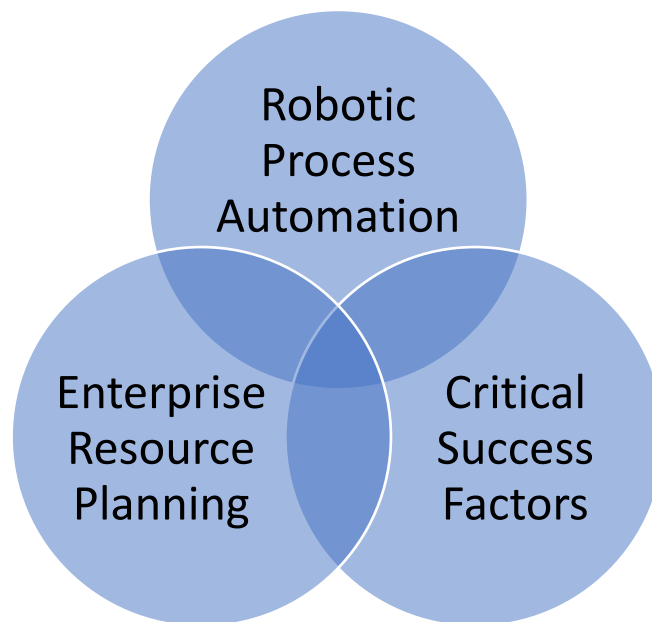

Figure 2. Framework for literature search.

Many RPA cases are already implemented in ERP systems, so RPA is researched more widely in practice by IT consulting companies and RPA technology providers. Consequently, the literature review of this thesis is also based on web pages and

studies of several IT consultant companies which cooperate closely with RPA technologies and have practical experience.

Firstly, the concept of enterprise resource planning is explained and its main functionalities in business are reviewed. Robotic process automation clarifies technology and presents the benefits of its use. Possibilities of robotic process automation enterprise resource planning present common business cases in ERP and opportunities for RPA implementations. The RPA critical success factors are explaining more deeply the fundamentals of RPA projects. Finally, the chapter is ended with criticism to the concept of critical success factors.

2.1   Enterprise Resource Planning Systems

Enterprise resource planning has its roots in manufacturing resource planning systems already in 1980's (Costa et al. 2016). ERP systems were invented to improve the organizational business metrics and make the business processes, such as inventory and goods movement, and their follow-up, easier (Bhumqara & Sayyed, 2017). A huge technological leap was done in 20 years and ERP systems are noawdays capable to manage all kinds of business functions by ERP transactions and data tables (Costa et al., 2016). All company core processes, not only manufacturing but also for example, financial, logistical and human resource processes, are linked to ERP, which can be seen in Figure 3 (Bhumqara & Sayyed, 2017).

ERP systems are great tools in making business since they are capable to provide operational, strategical and tactical support by providing comprehensive real-time data fast (Ruivo et al. 2017; Méxas et al. 2012). Currently, almost all organizations, which are trading goods, are using at least some kind of ERP software to organize and manage their business (Ruivo et al. 2017). Since ERP is such a critical tool in many organizations, it must correspond on the current business demand and be updated when needed (Bhumqara & Sayyed, 2017).

Figure 3. ERP functional modules (ESDS, 2013).

The module of manufacturing supports the production management, such as scheduling, production line optimization, material usage, production reports and forecasting. Sales and marketing module contains company sales functions, such as managing quotations, incoming orders, and issuing invoices. Inventory management module supports to keep the stock optimal and stable for incoming orders and it also helps to track the material movement. This module can be integrated into other logistical modules of ERP, such as purchasing module. Purchasing module is handling all tasks and functionalities related to procurement, for example, issuing inquiries, purchase orders, receiving material and updating stock. (ESDS, 2013)

Finance and accounting are about mapping all inbound and outbound finance functions and takes care of balance sheets, account ledgers and tax management. All financial data from other modules is transferred easily to this module. Customer relationship management helps to track and improve the relationships between vendor and customer. The module is storing details about customers, such as

communication history and sales. Customer relationship management is quite important when market competition is high and, therefore, this module can be connected to sales and marketing to boost sales. Human resources management is consisted of several areas, such as management of employees, departments, careers and training. It can be utilized for scheduling and shift handling. Additionally, performance reviews and payroll issues can be managed in this module. Supply chain management manages raw material or product flow from party to another. This module contains issues such as transportation, shipping, distribution, demand and supply management. Nevertheless, all organizations are not using all these ERP modules in their business, the number of used modules depends on organization's business size, industry and requirements. (ESDS, 2013)

Many ERP products are available in markets, for example from companies like SAP, Oracle and Microsoft (Costa et al. 2016). All products are slightly different to use, and they have different features and functions, therefore most suitable ERP system for organizational and industry purposes must be selected (Méxas et al. 2012). The usability, reliability, flexibility and functionality issues are important in terms of choosing the most relevant software (Méxas et al. 2012). Additionally, the implementation and customization take time and money so organizations must be quite committed to their ERP system for a longer period. Since ERP systems can be highly customized according to customer's industry and needs, some IT consultant companies, such as Accenture, Capgemini and Deloitte, are providing IT consulting, maintenance, integration and customization services that user companies could succeed in ERP implementation and use (Hassan, 2018).

ERP system can be integrated with many other company IT systems as well (Ruivo et al. 2017). As a result, companies are highly dependent on ERP. This causes a significant workload to deal with ERP related tasks. As an example, companies need many data entry clerks to enter all the data, such as order, delivery and billing information, to the system. Even if new releases on ERPs have significant changes and improvements in usability and reduction on manual tasks, according to Hodge (2016), one new and technology-advanced ERP product, SAP S/4 HANA, has still

20000 manual tasks or transactions in monthly financial Record-to-Report process. This means even multiple times more manual tasks if all ERP modules are considered. Getting rid of at least some of them would decrease the manual work and increase the productivity of company. What is more, all desired business transactions cannot be even done or are done inadequately currently in organizations using ERP due to significant amount of manual work. This may harm the company profit.

2.2   Robotic Process Automation

To clarify the determination of robotic process automation, the difference between hard and soft automation is explained. The term "hard automation" stands for a physical robot which is part of certain repetitive manufacturing or production process, such as assembling parts (Isaac et al. 2017, p. 1). Robotic Process Automation belongs to soft automation since it is not a physical phenomenon. It is programmed software which can execute computational processes instead of human (Isaac et al. 2017, p. 1).

It is important not to mix RPA with machine learning, artificial intelligence or business process management. AI can provide insights and make decisions, in other words, it simulates the human mind (Bornet, 2018). Furthermore, ML is a subsequent application of AI and it is the capability to learn and develop from data (Electronic design, 2017). There can be a danger that AI can assume incorrect issues and make faulty decisions. BPM is dealing with logic of business processes: it is about re-engineering processes or creating new (Willcocks et al. 2015). On the contrary, RPA can only execute tasks which are taught to it, so it copies human actions and does not change the logic of processes (Passy, 2018). RPA can work in front-end or back-end layer: front-end automation means that the automation is done on user interface level and it is only automating work related to single person and their computer. (UiPath, 2015). Chatbots are one example of RPA in front-end layer – human tells RPA robot what to do in a chat and if necessary, chatbot is asking more defining questions and then executing the action instantly. Back-end

automation takes place in application and database layer – it executes mass tasks or large transactions for company level needs around the clock (UiPath, 2015).

Therefore, RPA can be utilized best to start automation on repetitive or standard tasks which follow certain logic – calculations, reporting, data writing, data import and export in cross-system processing are general examples of RPA's possibilities (Lacity & Willcocks, 2016; Isaac et al., 2017, p. 1). It can handle a huge amount of data in a short period as it could take weeks by human. Consequently, better utilization of data without any human errors is possible. Several vendors are providing RPA software, such as UiPath, Blue Prism and Automation Anywhere. RPA can be implemented without programming with RPA softwares and tools: for example, UiPath is providing limited free community edition which does not require programming skills (UiPath, 2018).

The business processes are usually more complex to automate and therefore licenses need to be purchased for more skilled programs and IT consultant companies are needed to be RPA implementation partners and provide expertise in RPA field. Therefore, many IT consultant companies, e.g. Capgemini, Accenture and IBM, are providing RPA implementations and solutions based on earlier mentioned softwares (Aalst et al. 2018; Maity, 2015; Kappagantula, 2018). Those companies can also be called as RPA implementation partners.

Users can still be insecure to implement RPA more in their processes or even unaware of its functionalities (Hodge, 2016). Many can also criticize RPA for its inhumanity for example in customer service. However, customer service can even be improved with RPA since it works around the clock and customers can get service immediately (UiPath, 2018). However, RPA's opportunities are increasing, and its markets have boomed during the past few years (Aalst et al. 2018). The adoption of RPA is a competitive advantage and almost necessity in future as Aalst et al. (2018) claims that Return on Investment (ROI) can be accomplished fast when using RPA. The potential automation capability must be evaluated before

considering implementation as in Figure 4 since all processes cannot be automated due to their complexity.

Figure 4. Steps in RPA implementation (Asatiani & Penttinen, 2016).

Firstly, potential areas for RPA implementation are analyzed and reviewed, for example, using a workshop method. Secondly, most potential processes and their maturity are observed by monitoring human working with these processes. The aim is to map all actions and find the rule-based functionalities. Based on observation and mapping, the RPA implementation partner can provide business case proposal which illustrates how the automation will happen. If customer accepts the proposal, the implementation of RPA can finally start. (Asatiani & Penttinen, 2016) After implementation, the automation is moved to production and it is used in everyday business. It is maintained by following automated processes and making updates to logic and code, as well as fixing errors and problems.

2.3 Possibilities of Robotic Process Automation in Enterprise Resource Planning Systems

Customers are interested in provided value, not only on pure products or services. Value-based selling leads to increased value also for the seller (Töytäri & Rajala, 2015). This leads to a growing business opportunity for IT companies which are offering both ERP and RPA related IT consultant services. Projects can combine knowledge on both and provide the total solution, Software as a Service (SaaS). In addition to value-based selling, maintenance services for RPA solutions guarantee constant incomes for RPA supplier. As mentioned before, combining RPA and ERP brings multiple opportunities in business since some ERP tasks are based on manual work, some of which could be automated. RPA provides fast and significant results

without big projects since old ERP systems, interfaces and processes can be still used.

Technology advancement will increase the number of possible cases for RPA (Aalst et al. 2018). RPA can be utilized to automate already existing manual work and save some time and costs there. However, first and foremost, RPA is used to improve company's business metrics and to automate new work which is not existing yet. Rough estimate for future work division follows the long tail model: 80 percent of work can be executed by robotics and 20 percent must still be done by humans, which is shown in Figure 5 (Aalst et al 2018; Hodge, 2016). RPA can take care of all repetitive work in ERP while human employees have enough time to focus on few cases at once: the most complex processes and transactions as well as problem-solving and maintaining the robotics. Previously, only the left area of figure 5, called as traditional process automation, could be automated but now when technology has developed, also the middle area starts to become more feasible economically and technologically (Aalst et al. 2018).
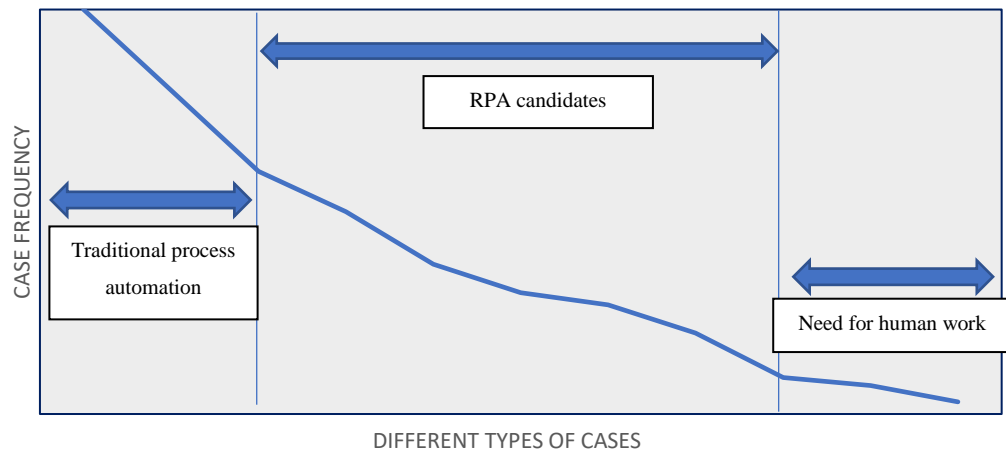

Figure 5. The long tail model of RPA (Aalst et al. 2018).

In addition to the savings in full-time equivalents, the key expectations of RPA are access to new functionality, improved performance and compatibility and usefulness with latest ERPs, as presented in Figure 6. Some other expectations to mention are accuracy and error reduction as well as the adoption of industry-

standard technologies (Intellichief, 2018). Reason for automation can also be a will to improve business metrics, for example, revenue and cash flow, or optimizing the logistical processes, such as boosting the procurement, stock or sales (Capgemini, 2019). The automation is boosting the employee and customer experience by modernizing the work (Capgemini, 2019).
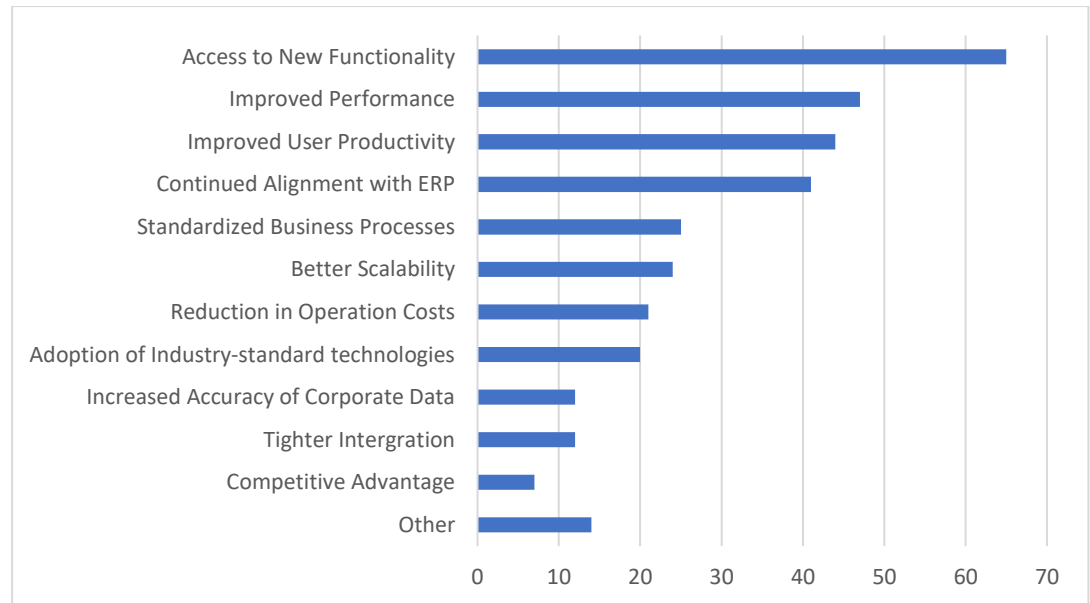
Figure 6. Expectations of RPA implementation (Intellichief, 2019).

To mention some examples of utilization of RPA in ERP, possible areas can be managing between various systems. Additionally, RPA can be used to integrate several systems if they cannot be integrated otherwise. The robot can update and share data automatically between different programs more easily than humans. Managing between many windows, tools and softwares can be time-taking and frustrating for humans and false data may be accidentally entered. If data cannot be copied, human can make mistakes while entering character strings. RPA can be utilized greatly in multi-program working conditions, for example in sales order management: it recognizes incoming purchase order from customer via email, logs on to suitable ERP system, imports the data from document and creates sales order automatically in ERP system and send automatically a production request (UiPath, 2018).

Automation can convert currencies based on most current exchange rates or set billing or delivery blocks if some data is missing. Furthermore, it can create, manage and sort invoices automatically when a delivery is issued. All documents, such as sales confirmation, delivery document and invoice can be sent to customer email automatically after they have been created (UiPath, 2018). Since RPA is doing everything straightaway, it benefits all parties – companies' workload and errors decrease, and customers get faster response and delivery times.

In addition to document creation, RPA can be used to optimize stock, help to deliver on-time, increase the efficiency of procurement, lower the time of Day Sales Outstanding, decrease the number of overdue invoices and automate financial functions. These issues are easing business but are also improving customer and vendor satisfaction. RPA can also be utilized in data processing. It can update automatically customer relation records and vendor records based on incoming and outgoing documents. What is more, data is in easily comparable mode as statistics are formed automatically by robotics. RPA can also handle periodic reporting automatically for example at the end of each month (UiPath, 2018).

Besides automatic work recognition, RPA can be utilized in ERP with a chatbot tool which is only executing tasks when human asks for it in a chat. The robot can do some customer-specific data changes in ERP master data section, for example, change the delivery address for a customer or add a new customer. These kinds of changes can be very simple to execute for human, but they may do it quite seldom, so they have to recover the process and needed transactions in their minds. Chatbot is a lot faster, and the speed accumulates in mass changes.

RPA behaves just like human by executing transactions and entering data (Sinha, 2017). Therefore, significant changes to ERP interface are not needed and RPA tools are designed to correspond existing ERP processes (Hodge, 2016). RPA can also assist humans in complex cases, prefilling data to sheets and ensuring data is correct. RPA can let human know all obscurities by sending notifications. It can follow human's behavior in some complicated cases and learn how to solve them

themselves if artificial intelligence is deployed side to side with RPA (Aalst et al. 2018; Willcocks et al. 2015).

Besides the automation of daily processes in ERP, RPA can also be utilized in ERP development or modification projects. RPA can execute testing, especially regression testing, and decrease the human workload in projects (Business Wire, 2017). This Robotic Test Automation (RTA) will help to meet the time and budget requirements and leaves no shortcomings or human errors in testing. It can also take care of the test reporting, so data can be supplied to employees as collected and analyzed.

2.4   Critical Success Factors

Even if RPA can be very useful and have high Return on Investment, RPA can still lead to costly and failed projects without satisfied automation solution. Projects have technical, organizational and socioeconomic aspects which can cause challenges and risks (Kopec et al. 2018). Understanding all these aspects helps to determine the project frames and highlight potential risks for the project which can result in time and cost savings as well as quality of solution (Finney & Corbett, 2007).

Technical aspect for IT projects is necessary. The requirement for RPA utilization can originate from the business department but RPA projects are, after all, IT centered projects. Customer's IT department and RPA consulting company are in very visible technical role since the automation is built around the RPA platform. RPA projects are not only technological journeys: above all, they are projects which require careful planning and project management (Finney & Corbett, 2007). Consequently, organizational aspect must also be considered – organizational challenges can be, for example, complicated processes flow and lack of management and collaboration between different departments. Lastly, socioeconomic aspect includes employees, their skills and education. Moreover, the communication and team working skills between humans are in crucial role.

Consultancy.eu (2018) has managed to compose a framework where all these three viewpoints are included, and comprehensive view is pursued. The framework consists of seven critical success factors for RPA implementation project which are: RPA strategy, RPA implementation partner, RPA technology, people, process maturity, IT involvement and project management, which are visible in Figure 7 (Consultancy.eu, 2018).

Figure 7. RPA implementation success factors (Consultancy.eu, 2018).

CSFs are the attributes which must be recognized and met: based on the success factors, the critical success strategy (CSS) can be created for the project (Yeh & Xu, 2013). If all CSFs are not in balance, a holistic view is not born, and CSS is not determined well enough, and then the project implementation can fail (Finney & Corbett, 2007). The CSFs must be considered and identified already in RPA project planning phase when creating the operating model for the project (Consultancy.eu, 2018). The success factors affect the profitability of RPA implementation and the final decision whether RPA implementation is worth of realization or not: implementation can be canceled if the project seems not to be profitable enough in advance. Additionally, post-implementation evaluation is truly important since it

can explain the reasons for failure and improve the performance of RPA team for later implementations of similar projects (Finney & Corbett, 2007).

The concept of success factors is not new, it has already been used to analyze the performance in many IT, especially ERP, projects (Finney & Corbett, 2007; Yeh & Xu, 2013, Ram et al. 2013). Even if RPA and pure ERP implementations are different, the success factors are quite similar and matching. Table 2 illustrates the interdependency between ERP and RPA critical success factors according to the recognized ERP success factors in an article by Finney & Corbett, 2007.

Table 2. Transforming the ERP Success Factors to RPA Success Factors.

ERP Critical Success Factor	RPA Critical Success Factor
Project management Project cost planning and management Project champion Top management commitment Communication plan Empowered decision makers	Project Management
Project team Team Morale and Motivation Training and job redesign	People
Client consultation Consultant selection and relationship	RPA Implementation Partner
Visioning and planning Implementation strategy Build a business case Change/crises management	RPA Strategy
Selection of ERP Legacy system consideration System testing	RPA Technology
Business Process Re-engineering Data conversion Post-implementation evaluation	Process Maturity
IT infrastructure Balanced team	IT Involvement

According to Finney & Corbett (2007), there are 26 identified ERP critical success factors. Consequently, their connection to RPA corresponding one is not unequivocal since there are only seven success factors for RPA according to Consultancy.eu (2018). Since some ERP CSFs are quite detailed, they can be seen part of bigger ERP CSF, for example, part of project management or business plan and vision. What is more, the nature of ERP projects is slightly different than in RPA implementations since ERP projects are about adding and changing business processes, RPA is only automating them.

Project management factor is about managing and supervising the project from planning to implementation phases, which means controlling the resources, schedule and costs, as well as committing leadership (Finney & Corbett, 2007). Therefore, factors of project cost planning and management, project champion or project manager, top management commitment, communication plan and empowered decision makers are bundled together with project management. The human resources are forming the project team. The team must be competent, motivated and, if necessary, trained, in order to succeed (Finney & Corbett, 2007). Since the team performance and individual competencies are highly interdependent, they can be transformed into RPA success factor "people". Many organizations need external consulting or implementor in their ERP projects. The same applies in RPA projects so therefore the success factors of client consultation and consultant selection and relationship are linked to RPA implementation partner.

The business case illustrates the strategic and economic reasons why the project is justified (Finney & Corbett, 2007). To determine the business case, it must be considered how often the process is run, how long it takes to be executed by human, is it even possible or reasonable to execute manually and which kind of need is to have the process in the first place. Visioning and planning contain clear objectives and goals which will be achieved to accomplish the business case. The implementation strategy illustrates the way how the project is executed, and goals are obtained. The strategy is not only linked to the planning – it is also referring how to react to changes and crises emerged during the project.

When the ERP implementation is planned, the ERP system must be selected carefully according to the business needs and the legacy or current system must also be considered how the transformation can be implemented (Finney & Corbett, 2007). Finally, the new system and fluency of process flow must be also tested. This same applies to RPA implementations – the suitable RPA software, considering the business needs and current ERP software features, must be found.

Before starting the implementation in ERP projects, the business processes must be considered and changed if necessary. The data in the system must be coherent to manage the implementation. Additionally, the post-implementation evaluation is important for ERP projects – that the business is still running as required. Therefore, these are bundled together as business or process perspective factors. To succeed in ERP implementations, the IT department must be present and the infrastructure ready for project as well as the communication between IT and business departments must be fluent. These factors are similar than the RPA success factor "IT involvement". (Finney & Corbett, 2007) The ERP success factors and their linkage to RPA success factors have now been presented, and next, the seven RPA critical success factors implementation are explained in detail.

2.4.1 RPA Strategy

Firstly, it is crucial to have correct RPA strategy. Company, which is aiming to implement RPA in its processes, must align the RPA strategy with company's other strategies (Consultancy.eu, 2018). For example, if a company has very ambitious RPA goals, it does not match with weak IT development strategy. The top management support is also important to succeed in choosing the correct strategy (Finney & Corbett, 2007). In the planning phase, objectives for project must be set, such as what the company desires to achieve with the project. The objectives are based on the built business case – boosting the business metrics or saving in the amount of manual work. The strategy is not only setting goals – but it is also planning how to achieve them (Finney & Corbett, 2007).

If the company is skilled enough, it can implement the project itself. However, it is important to recognize company's own capabilities while making the strategy. Only few RPA courses accomplished by company employees is not enough to make the employees professional RPA players since the processes can be still too difficult to automate or the solution can be poor (Willcocks et al. 2015). What is more, increasing the capacity and skills of IT department by hiring RPA professionals can be too expensive for the company. Therefore, the company can consider hiring external RPA implementation partner, which is quite conventional practice if company's own RPA capabilities are not strong enough (Willcocks et al. 2015). In the case of a need for external skills, competitive tendering for most skilled, suitable and reasonable-priced partner must be done. Prior to partner selection, the company must decide the suitable model of how to use the external resource in terms of RPA. Company can hire RPA implementation partner as license reseller, value-added consultant and reseller, outsourcing partner, Software as a Service provider or professional adviser or instructor for customer (Asatiani & Penttinen, 2016).

From RPA partner point of view, the license reseller is the easiest way to provide RPA services to other companies since it does not require big investments (Asatiani & Penttinen, 2016). However, this has low profit margins and does not oblige customer to use partner's services for a longer period. Value-added consultant model has bigger profit margins and opportunity to differentiate more from competitors. This does not either involve the customer for a longer period, only for the project duration (Asatiani & Penttinen, 2016). The next model is an outsourcing partner which does not cover RPA implementation in customer company (Asatiani & Penttinen, 2016). Instead, the processes are outsourced and controlled by RPA partner, which is not the purpose of research of this thesis.

The focus is on the last model SaaS, where the partner develops and implements the RPA solution. Potentially, the partner can also take care of the solution maintenance when the automation is running in production (Asatiani & Penttinen, 2016). From the RPA partner point of view, the SaaS model with maintenance services is the most profitable model to bring long-term customers. Customer is

engaged for project period, but regular incomes are brought also in post-project phases when continuous maintenance is made (Asatiani & Penttinen, 2016). Additionally, the needed effort from customer to manage and maintain the RPA solution decreases so it benefits the customer as well.

Optionally, the company can run the project by itself but hire RPA consulting to get professional support and help from RPA consulting companies for certain areas. For example, RPA partner can organize trainings to educate the people at the customer side to implement and use RPA tools. Furthermore, the used model for partner can be mixed – the responsibilities and automated processes are divided between partner and customer. Then customer does certain agreed issues according to its capabilities and leaves certain areas to be developed by the partner. To succeed in a mixed model, the responsibilities must be clear between partner and customer, but the project must be implemented in collaboration.

2.4.2   RPA Implementation Partner

Since the choice of strategy is affecting the role of the partner, RPA strategy and RPA implementation partner are success factors which are strongly connected. As mentioned earlier, RPA implementation partner can be strongly responsible for the implementation in some cases since it has the expertise in RPA field and the customer can have incomplete knowledge in some areas. Therefore, RPA implementation partner can be in a very crucial role in project successfulness and consequently, inexpensive price should not be the only criteria when selecting the partner (Consultancy.eu, 2018). Customer must choose a partner which matches best with its own organization and knows their industry to guarantee the quality of relationship and avoid cross-organizational risks (Consultancy.eu, 2018; Finney & Corbett, 2007). The partner must have comprehensive knowledge: both technical and business skills. Additionally, it can be a benefit if the chosen partner has ERP knowledge since ERP systems are usually large, customized and complex systems understanding of which can take time (Costa et al. 2016). A good business opportunity can be that partner has done earlier some projects for the customer since

customer's policies and processes can then already be familiar for the partner, but this is definitely not necessary since above all, RPA projects are IT development projects.

2.4.3   RPA Technology

One very notable actor in choosing the software is the newness of all RPA technology. Companies on the industry, including also biggest ones UiPath, Blue Prism and Automation Anywhere, are classified as start-ups (Nair, 2018). Therefore, all softwares have their own advantages as well as teething troubles and weaknesses (Kappagantula, 2018). Therefore, the pros and cons of needed functionalities between different RPA softwares affect strongly on the decision.

The legacy ERP systems are influencing the choice since potential problems can be indicated beforehand and avoided by suitable RPA tool selection (Finney & Corbett, 2007). Customer should not consider too much the license costs since the most inexpensive software can have major shortages. A secure choice is to select software which is used by many other companies. Furthermore, the RPA implementation partners have experience on most used softwares so this supports customer to select a well-known software.

Customer can have a strong opinion which RPA technology or software to use (Passy, 2017). They can even purchase licenses well before contacting and negotiating a contract with the partner. Therefore, RPA implementation partner must be able to work with several RPA platforms and both front-end and back-end techniques (Kappagantula, 2018). However, customer can also ask the partner to recommend certain technology which fits best for the customer needs since the customer may have a lack of expertise on RPA field. RPA implementation partner can have preferences or earlier experience from certain RPA softwares or has even made a contract with certain RPA software supplier and therefore prefers that technology in its projects (Maity, 2015; Kappagantula, 2018).

In addition to the choice of RPA software, the decision whether to use front-end or back-end automation in the implementation must be done. The front-end automation should be implemented on single separate processes to be executed on the user interface level. Massive and repetitive transactions and data transfers require back-end automation (UiPath, 2015). The decision between front-end and back-end automation should be done early enough and considered thoroughly. Recommendations on the choice between front- and back-end automation are also based on customer's technology, such as used ERP package, scalability to business requirements and policies, information security, the total cost of ownership, ease of use and control, ease of maintenance and support as well as quick deployment (Kappagantula, 2018). What is more, customer's industry, and processes being automated can affect the choice (Kappagantula, 2018).

Using incorrect technology can disturb the business and means of automation. The functionality of automation must be ensured before go-live by system testing (Finney & Corbett, 2007). The fluency of business process is not enough, the technology aspect must also be covered in testing – the robots must be capable to work around clock without any delays or RPA system crashing and guarantee the agreed service-level.

2.4.4   People

What comes to people aspect, it is important for both customer and IT consulting company to have the right individuals in RPA projects (Finney & Corbett, 2007). The RPA implementation partner's employees must have the latest knowledge and training on RPA and the partner company organization is responsible for their proper education (Willcocks et al., 2017). Furthermore, ERP knowledge can be useful on partner side – RPA implementations in ERP systems can be easier to execute if partner's employees have experience on certain ERP software, such as most used SAP, Oracle or Microsoft Dynamics. Since RPA is utilizing also cross-system integrations, know-how on several softwares and systems is a huge benefit. Employees of partner can accomplish certifications on both ERP and RPA

softwares to improve and gain skills as well as boost the company image (Kappagantula, 2018).

Partner's team must be cooperative and consist of multiple roles, such as project managers, RPA architects, technical developers and business analysts (Finney & Corbett, 2007; PwC, 2017). The project manager is the coordinator and responsible for the project. RPA analysts are more business-oriented experts – they are analyzing customer's processes and re-designing them for automation. Architects are responsible for the technological solution and developers are implementing it. The bigger project, the bigger team is – especially the number of developers varies a lot according to project size and number of processes. (PwC, 2017)

The customer has their own department in the project, for example, project managers, IT specialists and business users. It can be useful for customers that their end-users are participating in the project and receiving trainings (Finney & Corbett, 2007). RPA projects have various stakeholders and roles and consequently, social skills are therefore necessary for all team members. In order to succeed on RPA implementations, also the cross-corporate communication between customer and RPA partner must be good and comprehensive.

Socioeconomic risks of RPA at the customer side can be employee's fear of losing jobs and lack of RPA knowledge and awareness (Hodge, 2016). Customer's employees can see RPA as their competitor and therefore are not willing to use their inputs on the project (Asatiani & Penttinen, 2016). However, RPA is causing insignificant job losses since the objectives of RPA projects are usually to boost business metrics rather than focusing on employee reduction (Lacity & Willcocks, 2016). Nevertheless, end-users' nature of job may change after business go-live so the job redesign can be important and useful early enough (Finney & Corbett, 2007).

If RPA is implemented carefully and customers prejudices and attitudes are turned over, the negative impact for people factor is negligible. Therefore, it is important

for RPA implementation partner to have knowledge for correct communication and skills to implement a reliable and good RPA system which utilizes customer. Above all, the partner must assure customer about RPA's benefits and explain the realities. However, if the customer is being too skeptic for RPA they are never willing to make the first move and contract implementation partner in the first place.

Risk at the partner side can be a high turnover rate of employees. Since RPA is quite new and trending, the market is lacking of professional RPA experts (PwC, 2017). Consequently, there is a huge competition who gets the best RPA experts. They can get better working deals from other companies and leave the company, which cause interruptions to the project since new people must be trained to take care of new tasks. This can be avoided by committing employees and providing them good working conditions with competitive salary (PwC, 2017).

2.4.5   IT Involvement

Customer's both, business and IT, departments must be present and communicate fluently in the project, otherwise, some organizational challenges or conflicts can be born (Finney & Corbett, 2007). Therefore, IT department's involvement and cooperation with the line of business are important from the first steps (Lemann, 2000). IT department have better technical knowledge than the business department and they are capable to think about the operational challenges which RPA implementation can bring (Willcocks et al. 2015).

IT department can provide access to IT infrastructure, install softwares, consider the information security aspect and give support in user acceptance testing (Consultancy.eu, 2018). IT can also answer some questions from RPA partner better than business department or even participate in the implementation if they have the necessary RPA skills. This success factor is not so crucial for RPA implementation partner's capability to succeed in the project because the partner cannot influence the customer internal relations and connections. Of course, RPA

business partner can still encourage customer for deeper cooperation between business and IT departments and require a bigger role for IT.

2.4.6 Project Management

Project management takes care of overall handling of projects, such as planning and supervising milestones, costs, schedule, quality and resources (Finney & Corbett, 2007). Project management can be supported by organization's top management level (Finney & Corbett, 2007). The responsible person of project management is a project manager which must have technical, business and personal managerial competencies (Finney & Corbett, 2007). The success factor of people is highly dependent on this project management success factor since the management is steering human resources in projects. They allocate the jobs between team members and ensure progress is being done (Finney & Corbett, 2007). Improper project management can cause socioeconomic risks but also technical risks. IT project managers are not always technical oriented and therefore some mistakes on budget, resources and schedule can be made due to lack of technical understanding. This increases the support needed by the team.

Partner's project managers must control the budget very carefully and fairly notify the customer about it – the RPA licenses can be inexpensive but consulting or developing and implementation costs are usually more expensive for customer (Lazarus, 2018). What is more, the post-project maintenance services are forming the major cost share, and this must be told to customer. Costs are likely to increase if the implementation is not planned carefully beforehand and issues arise surprisingly (Finney & Corbett, 2007). The RPA implementation partner must be aware of all these issues when negotiating the contract and budget with client.

Project managers are also ensuring team communication is fluent and adequate. In addition to internal communication, partner's project managers are responsible of reporting the project progression to customer. They are usually the contact persons and communicating with the customer when necessary, it is always important to

keep the customer posted what is under progress. Project managers' tasks are to follow the project and make decisions if some actions, such as changes in budget or even project abortion, are necessary (Alias et al. 2014). The critical danger points in projects are excessing the budget or hitting overtime (Consultancy.eu, 2018). Customer can have also their own project management teams which are promoting customer's own interests in the project. Consequently, a cooperation of two separate project management teams must be present and the goals of both teams must be met.

2.4.7   Process Maturity

To succeed in RPA implementation in ERP, the ERP processes must be clear and unambiguous. Organizational challenges consist of confusing processes which are not well-defined within a company. Additionally, RPA is only automating existing processes in ERP, so the complicated business processes are still there (Asatiani & Penttinen, 2016). Consequently, RPA is not worth of implementation if the process is too poor since it is not improving the flow of bad processes, it is only making them faster but worse (Passy, 2017; Lazarus, 2018). This can reflect how customer see the potential benefit on their business and RPA is only seen as a temporary solution (Asatiani & Penttinen, 2016). The business process design is under customer's responsibility so if the process is too complicated for RPA, the RPA project must be started by business process re-engineering (Finney & Corbett, 2007). The RPA partner can provide support in this.

The implementation partner, especially RPA analyst, is responsible of evaluating the process maturity since not all ERP processes cannot be automated – it must be kept in mind that only simple repetitive ERP tasks can utilize RPA in automation (Lacity & Willcocks, 2016). It must be noticed that RPA implementation partner is not responsible for customer process quality and the partner can say that the process is not worth of automation if the process is too incoherent or complicated. If the process is too complicated to be automated, it is likely to stay under the current operation mode. The partner can propose to redesign the process to be more rule-

based and after that, the automation possibilities can be considered again. Customer can have opinions but after all, the partner has the latest knowledge which automation is possible and especially feasible. It must be noticed that RPA implementation partner is not responsible for customer processes and errors in process logic, and it is not their job to repair customer's business.

Customer's own wishes must be also heard but observation and perception are more important since the customer is not always aware of all their needs. Process maturity can be evaluated for example by following customer performing current ERP processes (Asatiani & Penttinen, 2016). Cost, time, performance and benefit aspects must be considered. Most complex processes located in the long tail are not mature for RPA implementation (Aalst et al. 2018). It is natural and feasible to start automation on most repetitive processes which are likely to be successful in terms of automation possibilities (Consultancy.eu, 2018). Processes which have low automation rates should be prioritized rather than increasing the automation rate of already highly automated processes (Geyer-Klingeberg et al. 2018). Nevertheless, it must be noticed that there can be a good reason why some processes have low automation rates: they are difficult to automate.

After implementation, the successfulness of project maturity is easy to evaluate by RPA output verification (Willcocks et al. 2015). Furthermore, the less RPA's errors, work allocations and maintenance needs for human employees, the more mature and well-implemented is the process. However, RPA can reach completion rate of 100 percent in rare processes (Willcocks et al. 2015). Some complicated minor cases need humans to be solved. For example, if human has entered information wrongly in the database, email or software in the first place, RPA cannot read it and the case fails, and consequently, RPA can also have human-based errors.

Properly executed implementation can be valid for years and costly changes are then not needed. Continuous maintenance must still be made: the process flow should be monitored in case of changes in the system or other conditions since they can influence the automation (Geyer-Klingeberg et al. 2018). RPA technologies can

require some maintenance which can be costly to a company, especially if the implementation is not done carefully – the automation must be monitored, defects and incidents must be taken care, rules changed, if it is necessary, and constant support for users must be given (Willcocks et al. 2015).

Data quality is an important factor – data must be qualified, reachable, and multiple input data formats must be avoided (Kopec et al. 2018). The data quality is highly connected to the factor of process maturity: the process is not mature if data is not accurate and it is in improper format (Finney & Corbett, 2007). Additionally, it is necessary that RPA utilization cannot make other work in ERP systems more difficult. For example, double or useless work should be avoided.

2.4.8   Criticism of Critical Success Factors

Since any framework is not solid, also CSFs have some drawbacks. The framework can be built by project managers only and then the overview is not holistic (Finney & Corbett, 2007). Therefore, all stakeholders in the project should be heard. Furthermore, it is hard to determine absolute truth according to CSFs (Finney & Corbett, 2007). Costs, used time and reached goals between similar projects can certainly be used to compare and evaluate the CSFs but sometimes the goals are not measurable, and successfulness of different factors is only the opinion or review of stakeholders (Finney & Corbett, 2007).

The opinions and goals for success between different stakeholders or departments can also vary and consequently, finding the absolute truth can be difficult (Yeh & Xu, 2013). For example, project managers can be interested in project management and people aspects, and on the other hand, RPA developers may concentrate only on the functionality of technical solution. People who have worked with the project for a longer period can become numb and fail in searching pain points. It could be useful to need some fresh pair of eyes to find the weakest parts of the success factors.

Since the success factors together build the critical success strategy, it is not worth of only concentrating on success factors separately. Based on the analysis of seven factors, they are highly related to each other and therefore a big picture should be composed to create the CSS successfully. Additionally, CSFs limit the study only on those pre-determined factors so other important issues and their impacts on projects may not be considered at all (Finney & Corbett, 2007).

2.5   Final Thoughts on Literature Review

As a summary of critical success factors, the outcome of all seven factors must be evaluated in the planning phase as all factors play an important role in robotic process automation project, otherwise, the RPA implementation can fail.

Even if all success factors are important, based on the literature review of critical success factors, the decision on strategy is very crucial since it is where projects should start, and it leads the choices and actions in other critical success factors. In order to advantage most on strategy and improve performance in the future, it is crucial to set a common goal for all CSFs in cooperation by various stakeholders in order to create a commonly agreed project model. The strategy is not only making decisions, but it is also planning how to execute the project and how to reach the goals. The planning of project is also linked to other success factors, such as decisions on which RPA technology and processes to use and how those are utilized in the project.

RPA implementation partner also seems to be very important. The partner is either responsible or power player on almost all success factors or, at least, it is advisor and influencer for the customer. It is responsible for project success especially in SaaS model since it is planning and deploying the solution on behalf of the customer. This consequence strengthens the reasoning for the chosen research questions and sets the partner to the spotlight of the research.

The company can start RPA implementation with the simplest tasks. These first projects can be used as a framework and lessons learned from errors for the future (Burnson, 2018). Later even more complex processes can be automated when RPA is familiar for the company. Furthermore, the company can also later consider deploying machine learning or intelligent automation to work hand in hand with RPA (Bornet, 2018).

If the project was not successful in the end, hearing stakeholders who do not consider the project as successful is important (Finney & Corbett, 2007). They can analyze and explain the unsuccessful issues and pain points from their point of view. The effective analysis and feedback may teach important issues what went wrong, and some changes on the operating model can be done to succeed better in the future. It is important for an implementation partner to have satisfied customer – the project is not successful even if implementation partner considers so. Customer must also consider the project as a success.

3   RESEARCH METHODS

This chapter explains the research methods used in this thesis. Firstly, the methodology justifies the selected method in this study. The data collection part explains the background of conducted semi-structured interviews and introduces the interviewees. Last, in this chapter, the data analysis method is described.

3.1   Methodology

Since the purpose of this thesis is to find the elements which make the RPA projects successful, the research conducted is exploratory and qualitative (Saunders et al. 2009, p. 139-140). The questions may be complex and there may not be absolute truth or only single answer to a question, so in order to guarantee the best outcome, the study is deployed with interviews with semi-structured questions (Saunders et al. 2009, p. 324). In this kind of research, the questions are drafted beforehand and organized in themes, but the flow of conversation can affect questions to be added, changed or removed (Saunders et al. 2009, p. 320). The answers are not the only way to find answers – the body language and tone of voice can also help to analyze the results.

Reliability measures the consistency of the research findings (Saunders et al. 2009, p. 156). In semi-structured interviews, the reliability can be at risk since the procession of the interview is not fully defined and different occasions can give different results. Additionally, the persons are in a big role in their organizations or companies – attitudes towards interviewee or interviewer can influence the data collection (Saunders et al. 2009, p. 156-157). Selecting the correct interviewees is a common issue in reliability since interviewees can influence the outcome a lot. Validity describes whether the research findings really answer the research questions which it intended to (Saunders et al. 2009, p. 157). It can be difficult to find the causal relationships in the semi-structured interview method since the interviewee cannot tell everything and they must decide the most important issues.

3.2   Data Collection and Analysis

The primary data is collected by conducting four face-to-face interviews: four RPA specialists in company X are interviewed individually. Company X is a multinational IT consulting company which has a large market share in offering RPA solutions in Finland. The company provides all kinds of RPA partner services: from consulting to developing and maintaining RPA implementations as well as other IT services, such as ERP related services. As can be seen in Table 3, interviewees are quite experienced in RPA and have seen different kinds of RPA implementations during their career, this is the reason why these individuals have been chosen to be part of this research. RPA is still quite new technology so nobody has very long experience in RPA, and even the interviewees with experience of 2,5-4,5 years are quite professional. Interviewees with various backgrounds are chosen to receive insights from different viewpoints. Additionally, interviewing mainly managers supports the choice of research method since managers are prone to share their insights in interviews (Saunders et al. 2009, p. 324). Secondary data from the literature is used to support the results from interviews.

Table 3. Interviewees' backgrounds.

	Job Title	Years of Experience in RPA
Interviewee A	Head of Nordic Intelligent Automation Center of Excellence	4,5 years
Interviewee B	RPA Architect	2,5 years
Interviewee C	Managing Intelligent Automation Architect	4 years
Interviewee D	Managing RPA analyst	3 years

The interviews were structured as follows: firstly, the purpose of the research was explained, and interviewees were briefly explained the framework of seven success

factors for RPA implementations. Secondly, interviewees were asked about their background in the RPA field. The interview consisted of eight elements: all seven success factors and a holistic evaluation of the success factors. All interviews were covering the same eight parts and the question frame was the same. Questions were already drafted beforehand, but some new supplementary questions were arisen in the interview session to wake some conversation. Furthermore, all prepared questions might not have been asked or answered since the purpose of the interviews was to focus on interviewees' own thoughts rather than answering strictly to all questions. The purpose was to keep the answers of interviewees short but very informative and descriptive. Main points of answers were written down by the interviewee but to leave time for observing behavior and focusing on discussion, the interviews were recorded to be fully recovered afterward.

The questions covered both successful and failed cases since both are important for the analysis of success factors. The failed cases can reveal important facts since there can be a small minor issue which may have caused the failure of whole automation (Finney & Corbett, 2007). In successful projects, it can be harder to find the most critical factors which caused the success. Furthermore, it is easier to remember which went wrong than which was correct or right in old projects (Finney & Corbett, 2007). A time limit of one hour was reserved for one interview. The interview question pattern is available in the appendix section.

One limitation for this study is the confidentiality of the IT business – the interviewees cannot reveal any details about customers or projects. Therefore, questions were answered only in general level and the answers were based on their own experience and not only focusing on certain cases. However, this can also be a benefit – experience and insights on multiple projects can form a holistic image since separate projects do not tell the whole truth. Moreover, as described before, the research reliability and validity must be investigated to understand the research credibility. Based on the criticism of CSFs, the interviewees do not know the absolute truth for sure and they could consequently give only their thoughts and opinions what influences most the project success or failure. Selecting the

interviewees is in a critical role: choice of different professionals could have led to different results since all the RPA experts have their own different backgrounds and they experience certain issues differently. History is affecting the validity of data collection: most recent projects are easier to remember than older projects. Additionally, if something significant or crucial has happened lately, it is prone to influence answers strongly (Saunders et al. 2009, p. 157).

It must be remembered that interviews were realized in only one IT consulting company and only four specialists were interviewed, so the conclusions drawn from interviews must not be too generalized (Saunders et al. 2009, p. 159). Other IT consulting companies could have observed different issues in their projects or their customers can represent different market segment, such as various industries or scale of business. Additionally, customer organizations were not interviewed – customers can perceive value from other issues than partner does.

The research uses qualitative data analysis which consists of three phases: data reduction, data display and drawing and verifying conclusions (Saunders et al. 2009, p. 503). Firstly, the analysis starts by finding the key points of all interviews for data reduction purpose (Saunders et al. 2008, p. 503). The main findings are summarized and listed in a table. Then all data collected from interviews are composed together and analyzed in categories based on the framework of seven success factors which helps to structure the data and its further analysis (Saunders et al., 2009, p. 492). The more issue occurred in data collection, the more weight and importance it has in the analysis. The impacts of all success factors on the big picture are evaluated and conclusions to overall success are drawn based on finding the meaning of the data (Saunders et al. 2009, p. 505). The most important findings are represented in chapter "Discussion".

4   RESULTS AND ANALYSIS

The purpose of this chapter is to express the main points of the interviews and provide further analysis of the results. As assumed, four interviewees revealed different issues since their job positions and backgrounds are different – they are even technical or business oriented, or in managerial or non-managerial position. Therefore, interviewees emphasized topics which they personally considered important or their way of expression varied. The different backgrounds made easier to form a comprehensive view of implementations and their success factors.

Firstly, the main research findings, which are highlighted in the interviews are presented shortly in the next subsection. Then all, not only main, results are analyzed in subsection 4.2. and possible consequences for project success or failure are considered.

4.1   Main Results

It emerged that interviews revealed and emphasized different issues than literature review since RPA is not academically researched and it is studied more practically on consulting papers. The papers are made by IT consulting companies and every company has its own operating models. Therefore, there is no standard or common line between literature and interviews, especially since the interviews were conducted in only one IT consulting company.

All interviewees highlighted the importance of planning, specification and setting the correct objectives to improve business metrics. All four emphasized the importance of common objectives and operating model between the customer, both IT and business departments, and the partner. However, managers, or interviewees A, C and D, are paying attention more on big picture and an employee, interviewee B, more on everyday project tasks and issues, such on communication and importance of project manager. However, this is natural due to the nature of their work – employees are doing hands-on work and managers are more supervising the

holistic situation of partner's all projects. They also mentioned that RPA is not always the best solution for all cases, also other options must be considered. Otherwise, their responses were little varying based on their knowledge area, but answers are supplementing each other and were not in contradiction. Table 4 shows the main elements of success based on interviewees' insights.

Table 4. Main elements for RPA project success based on specialists' views.

Interviewee	Main points
Interviewee A	- Importance of operating model, common objectives and planning - Responsibility of project owner, defined roles in team - Not focusing only on replacing human work - Importance of maintenance
Interviewee B	- A standard model for implementations - Good project team communication - Customer commitment to the project
Interviewee C	- Determining business case, expectations and business metrics - Top management support - Importance of maintenance - Considering other solutions than RPA as well
Interviewee D	- Parties' capability to make decisions and act fast - Partner as a business and process consultant - Correct business metrics in projects - Considering other solutions than RPA as well

The first interviewee, A, emphasized the importance of common agreed operating model. He emphasized project managerial issues in the interview since he is used to manage and supervise issues as the Head of Nordic Intelligent Automation Center of Excellence. The project planning and design are crucial since it forms the frames for the project and influences all project phases. The common operating model is necessary to have from the very beginning, but it is important to consider the big picture rather than focus on smaller details. The operating model must be agreed with all project parties and common guidelines and objectives must be

negotiated. Part of the operating model, finding the owner and responsible party of project are crucial issues in terms of success. The operating model obligates customer and partner to have a problem-oriented start. The problem should first be properly analyzed and specified, and the solution should be formed later. Therefore, automation projects should never be solution-oriented projects since RPA is not always the best solution technically. IT projects can also utilize other tools, such as system features and settings, system integrations, AI or process re-engineering.

Interviewee B works in a technical role as architect and works in projects daily in close cooperation with the team, and he considers that the team is the key to success. Additionally, the communication between team member must be seamless, also in cross-organizational communication between partner and customer. This ensures that the aims and goals are mutual. A large threat for the project can be that the project manager is replaced in the project when it is still unfinished. Customer role is also important – they must have enough time and resources for the project and their attitude towards RPA must be in place: they must really want to automate and do the project at their own maximum and try to benefit from RPA as much as possible. Additionally, interviewee B argued that the standard model has not yet born for RPA implementations. From customer's point of view, it would be useful if all RPA consultant companies had a coherent approach.

Even if interviewee C has a technical background as an architect, as a manager he also emphasizes the business issues and the big picture in projects. For example, he keeps the measurement of project success important – how the success of automation project is measured, by saved full-time equivalents or set business metrics. If project benefits or expectations are not achieved, or they cannot be measured, the project is most likely to fail. Therefore, it is crucial to set numeral and reasonable business metric goals which are guiding the implementation to the correct direction and ensuring the maximum benefits for the customer. An organization should have top-level management support for project execution since it pushes the organization to go bigger and sets ambitious but realistic objectives.

In addition to interviewee A, interviewees C and D also highlighted the importance of considering other technology solutions parallel to RPA. Interviewee D continued this by highlighting the fact that RPA implementation partner is not only an IT agent. Partner must have skills also in business and process consulting since it is case dependent which technology to use in automation. RPA project have an agile nature – projects are quite short so fast decisions and actions must be done from both, partner and customer, sides. Interviewee D is managing analyst and specialized in sales, so he emphasized issues which are sales-related. He pays attention also to partner's whole portfolio, not only to single projects even if he is also doing hands-on work. Interviewee D also emphasized the importance of correct business metrics, like A, B and C, but he also mentioned that set objectives and Key Performance Indicators (KPIs) can be changed during the project since only the first implementations show the path which kind of changes the automation brings and what is the final direction of automation plans.

4.2   Data Analysis

This chapter composes the conducted four interviews as a single analysis. Interview results are presented and analyzed further in the seven critical success factors categories. The possible reasons for failure and what can be done otherwise are also covered.

4.2.1   RPA Strategy

Interviews support the observation from literature review RPA strategy is a very important success factor – without a comprehensive and coherent strategy the project is in danger to failure since the sense of direction is missing, and project objectives may be forgotten. The company must form the RPA strategy, or at least set foundations and requirements for it, and attach it to their digital strategy. It emerges in interviews that term "RPA strategy" is misleading – companies should have a holistic strategy for their technological aims and ambitions since RPA is

technologically not the only and always best solution and thus, using term "strategy" is more appropriate.

First as part of a strategy, interviewee A stated that the responsible party or owner must be determined at the customer side. In terms of project success, the owner should be from company management and if not, the responsible person should have full support from the management. Moreover, the person should have experience in company and its systems and applications from longer period time. Externally hired "RPA managers" are not familiar with the systems, processes or people.

If the customer is not able to nominate the project owner, the partner can suggest taking this task under its own responsibility since the project can lose its straightforwardness without a proper owner. If only individual person or team is forwarding the automation project, there can be an enormous risk that only their interests are monitored. Above all, automation projects should benefit the whole company since the proper investigation must be done at the start, so the automation can be utilized for other teams as well with only small effort. Furthermore, a single small team can struggle in proceeding without any company level support. Automation can turn out to be pointless if it is has implemented in too small scale or without proper funding. If automation is despite all implemented with too small scale for single person, team or department, and it is a huge success story, the company should definitely consider implementing it to concern to the whole company. The advantages and improved business metrics are then bigger and payback period shorter.

According to the interviewee C, the upper management is more eager to set ambitious objectives and metrics for the project, so the project outcomes can be seen in whole company profit. The sort of objective must be clarified – is it about boosting business metrics, creating new business or work, savings in full-time equivalents or combination of these all. However, unlike literature review mentioned the potential of savings in manual work, all interviewees highlighted the

fact that the objective of saving money only through decreasing manual work is quite risky and narrow-minded since RPA is capable to do much more, for example, RPA can save only little bit from full-time equivalents but improve quality, make monitoring easier and reduce errors massively. Only some industries, like banking and insurance, have so many manual tasks that their reduction is useful. What is more, according to interviewee C, human resources at Finnish organizations were reduced to minimal level during the recession in 2000's, so decreasing the manual work now even more is almost impossible. Instead, there is a huge potential to set the robots do issues which employees currently do not have even time for due to the resource scarcity. If the customer has strong prejudices that RPA is only replacing on human manual work, it can be a huge problem and often obstacle for starting an RPA project.

The objectives must be clear enough. Numeral objectives, such as increasing sales by 20 percent or decreasing costs by 20 percent, are the best since there is something tangible to be aimed at. To set realistic objectives, the business case, for example, which processes will be automated, must be validated first. However, the set objectives must be able to be measured. Interviewee C highlighted that projects are prone to fail if objectives are not set, they are too ambitious, or the automation benefits, such as an increase in sales due to automation, cannot be measured properly. These kinds of projects are failing since they are a disappointment to the customer company.

Interviewee D stated that the objectives of RPA project in the beginning are only initial and the customer must change the objects during the project if necessary. When the first implementations have been done, the customer may notice that the objectives are not realistic or do not cover the whole potential of RPA. Interviewee D told an example of one of company X's first RPA project which automated customer's ticket handling system. The project objective was to decrease the manual work by one full-time equivalent. Along with the project, customer's clients started to have an immediate response on their service request tickets and their satisfaction level was also raised, which was not foreseen at the beginning.

Therefore, the project advantages were larger, and the project was even more profitable than expected. If all benefits are noticed beforehand, project can seem to be unprofitable even if it actually is profitable. The first implementations show how the process automation is really changing the business metrics.

Gaining experience on RPA and observing business metrics during first implementations support customer to reset the objectives. There is always a risk to use the same objectives, and after many implementations, customer can notice that they have used a large amount of money on RPA, but the gained benefits are not profitable at all. Due to all these reasons, setting realistic objectives for desired key performance indicators is a very important part of the strategy and one of the key elements for measuring the success of the project.

In addition to objectives, interviewee A emphasized the importance of operating model in part of the strategy. The common operating model must be negotiated and agreed with all project parties before the project can start. Interviewee A mentioned that there are plenty of projects which have failed since the project was started before negotiating the operating model. Good operating models contain the rules on how the documentation, change management, maintenance and supervision are managed, and how roles and responsibility areas are divided.

According to interviewees B and D, many RPA unexperienced companies are eager to try RPA as a technology and its capabilities. This is definitely an incorrect approach to do small technology testing without any risk or real benefits in business because this does not prove the real value of RPA according to interviewee D and only wastes money and time. Interviewee B proposed that customers should start properly, use money and resources and aim for big already at the beginning, which have been a real problem for some customers. If the customer is having a negative attitude towards RPA or is not willing really to utilize RPA, it impacts negatively on ambitiousness and success.

Both literature and interviews highlight the impact of customer's digitalization degree on strategy formulation. It is important for the customer to recognize their employees' IT and RPA skills and capabilities. If the partner has no knowledge on RPA, it does not mean project failure according to interviewee B. They must set their own role according to their resources and skills and if necessary, hire RPA implementation partner to cover shortages in knowledge.

However, even in the SaaS model, customer participation is crucial, and at least business process experts must be part of the project. Based on interview B, customers sometimes are underestimating their time and resources to the project and without customer participation, projects are struggling. It is quite common that customer is overestimating its RPA development skills – they might think that few RPA trainings and technologically-advanced RPA tools are making them professionals. Partner's role is to remind the customer of the complexity of RPA implementation and provide support through the project. Additionally, the partner providing help in setting objectives can be useful – the customer does not always know what is realistic and then disappoints if their unrealistic goals are not met even if the project is otherwise successful. When the customer knows the relevant expectations from the beginning, they more likely consider the project to be successful.

At the moment, many companies are currently often transferring, or planning to transfer in the future, their ERPs to new cloud-based systems. These transfers are not just updates, the new ERP system can totally new product even if the ERP provider is the same, and this can cause obstacles or prevents RPA implementations in ERP. ERP strategy can be prioritized over RPA strategy since customer, are perceiving that ERP is something more long-lasting than RPA. Therefore, customer can be skeptic to deploy RPA in its processes in the middle of this transformation era. Interview C revealed especially customer's ERP system end-users can desire for a solution to relieve work and boost outcomes until new ERP system is implemented but IT department may not see the business case and can consider the RPA implementation as wasted work. In cases like these, the business case or

advantages versus costs must be calculated in detail. If the automation is profitable to be implemented still in the old ERP system, partner's role is to encourage the customers to deploy RPA. Automation projects can be quite small and fast with instant advantages, so in some cases, RPA projects can be started even if the old ERP is valid only for one year. Nevertheless, even if the automation projects are small, they require a lot of work – lot of work is required before the automation is in production. Customer must consider whether the automation is profitable in terms of work even if it could be in terms of costs. On the other hand, ERP ramp-ups are frequently long and complex projects, so the implementation schedule can exceed, and especially then the business case for RPA utilization is real. If the processes are kept alike also in the new ERP system, the same automation can be utilized there as well.

According to interviewee C, very old ERP systems are usually not as automated as new ones and have more manual processes. Consequently, utilizing RPA there can be very useful and beneficial. However, interviewee C considered that old ERP systems can be difficult to be automated due to the old technology. What is more, transferring to a totally new ERP system could be a more beneficial and long-lasting solution since fixing old ERP with RPA is probably only temporary and bad solution. Therefore, customer's ERP system's validity must be considered, and the partner should give recommendations in these cases.

4.2.2 RPA Implementation Partner

RPA markets have developed during past few years, and partners have started differentiating. The interviews supported the literature review – it is an advantage that the partner has also industry and business knowledge in the planning and specification phase when process and business knowledge is useful. In implementation and maintenance phases, their job is purely technical so deep industry knowledge does not play a major role there. What is more, industry knowledge is less significant in RPA implementations in ERP than in other RPA projects since the implementation is so integrated to the ERP system. Therefore,

processes in ERP define the implementation more than industry-specific issues. Consequently, partner's knowledge of multiple ERP systems is a huge competitive advantage in ERP automation projects which go more fluently and faster without the necessity to ask self-evident questions or advice. ERP knowledge is not so crucial or the main point on the RPA employee level, but it is beneficial. What is more, if the partner has also a separate ERP team, some system consulting can be asked there in most complicated tasks. In some cases, automation is not needed at all and the solution for the problem can be solved by utilizing only ERP system's internal features and settings of which the ERP team may be more aware of than pure RPA partners.

The most important differentiating factor between various partners is offered service models, meaning whether the partner is doing only implementations, working with complementary SaaS model or supporting the customer through RPA journey, for example implementing together with the customer or providing help in a certain area. Interviewee D mentioned that many RPA pure players, which are only using robotics in their solutions, have entered markets. They cannot provide any other insights than RPA, which is a risk. A holistic IT partner is capable to some much more than only RPA, usually, they start the project with business consulting – the partner can provide consulting for ERP systems and processes and listens to customers ideas and objectives. Some cases can be solved with only deploying certain system features, changing settings in system or teaching customer to use their system properly. If some problems are still unsolved, the technological change needed can be something else than RPA, for example, system integration. This simplifies the case a lot, and RPA is not needed at all. RPA pure players cannot provide any other consulting services and they can deploy the most complex and bad solution in the worst case. What is more, pure IT players can have difficulties to understand processes and business and industry-specific issues which are crucial to understand in RPA project's specification phase. Since implementation partner should do a lot more than RPA, the success factor "RPA implementation partner" is a little bit fallacious and partners which are able to provide only RPA related services are risky for customer.

It is a benefit if the partner has local knowledge and presence in Finland according to interviewee D. Many Finnish companies, especially financial ones, are still using only Finnish language in their systems and processes. Therefore, partner's ability to speak Finnish is important. Additionally, the capability to meet customer face-to-face in Finland is very useful since it can convince the customer of partner's skills, ensure more intensive cooperation and pursue additional sales in the future. Many IT consultant companies are having offices only in countries like India, which can have difficulties to be present physically in Finland. Multinational companies have a local presence but also departments in more inexpensive countries, and this is a competitive advantage – they can provide local knowledge but also a competitive price and international skills when utilizing also departments from other countries.

Interviewee B mentioned that all RPA vendors are working currently with their own model in the markets and no common standard model is applied between them. The standard model could contain rules which kind of model is it about, for example, is maintenance excluded or is it the SaaS model, and create common frames for project planning and objective setting. From the customer's point of view, it would be helpful to have coherent and unified policies for implementation since customers can then easily compare the available partners and are more aware of what exactly is been provided. Furthermore, this would utilize also partners since then there are determined steps for implementation and risk for failure is smaller.

Partner must be able to work with all customers. Technology and process perspective can be the same, but experience has shown that policies, tools and ways of acting vary a lot from customer to another. This can lead to project failure but can be avoided by agreeing on the responsible party, landscape, operating model and expectations in a common meeting already at the beginning. At the moment, this agreement is occasionally done too late with the customer. The cooperation between all parties must be fluent throughout the project. If the partner is automating only small area in project and customer takes care of the rest, the partner must still understand the big picture and how partner's area is linked to other

processes so overlapping automations or process breakdowns does not take place. Nevertheless, the work division and understanding the own responsibility between parties must be clear in all cases, also in the SaaS model. According to interviewee B, a textbook example of a typical problem is that both customer and partner know what they should do in the project, but the customer does not know exactly what partner is doing and the partner does not know what customer wants them to do. This loop can be avoided by better communication but also agreeing on the clear roles and operating models in the beginning. Interviewee C stated that customer does not have to know how the automation is done or other technical issues but crucial is to answer partner's questions what the problem is and how it is currently solved, understand the outcomes of automation and control the change management in the organization.

4.2.3   RPA Technology

The findings from interviews support the literature search. The most used RPA tools are safe and good choices. UiPath is dominating the markets in Finland but the competition in markets has grown in past years and it has led to smaller price differences between products. Interviewee A emphasized that the license costs are likely to be less than 10 percent of total project costs, including maintenance costs, so the license price should not be paid too much attention to since it is not so significant amount. Additionally, the choice on software should be based on suitability on own use purposes – processes being automated, customer's industry-specific issues and is it back-end or front-end automation must be considered.

Surprisingly, interviews revealed that customer's ERP system does not influence the RPA tool choice directly and all tools are valid for all ERP systems, but small details may have to be especially considered in integration between certain ERP and RPA tools. Partner's access to customer's ERP system is impacting more. If the partner does not have native access to the system, the RPA tool is only seeing pixels instead of the code on the screen. This makes the automation more difficult and insecure since the tool must read the screen on a pixel-basis and there can be

misunderstandings. In these cases, the partner must convince the customer to give partner the native access to the system to guarantee the quality of implementation.

Interview A's insights support the literature review that the related work can be much smaller and quality better if suitable RPA tool according to business processes is chosen. The drawbacks of software must be covered by additional work and development if the cheap and unsuitable tool is bought. Unsuitable RPA tool can lead to budget and schedule management problems or even usability and maintenance problems in the production phase. However, wrong software cannot be chosen in technological mindset – all RPA tools are capable to do the same issues, but some issues are more easily done with one specific tool than another one. Consequently, a tolerable software can be turned into well-functional one with hard and professional customizing, but it certainly increases the budget and prolongs the schedule. This scenario can happen if the customer purchases the licenses independently without any experience. In the worst case, RPA is not needed at all and the solution needed can be deployed with other technology. Then the licenses are purchased for nothing. Interviewee C stated that the RPA tools may develop their features and differentiate more from each other, so the selection of software does matter more in the future. The transition progress to more differentiated tools must be monitored and tools must be more compared when differentiating has started.

Partner is always a professional what comes to selecting the correct RPA tool for specific customer needs and therefore, the partner must understand and know many tools. This must be furthered to employee level – a single employee must know and handle a couple of tools since the tool may be decided beforehand and employees must adapt themselves on the choice. According to interviewee B, the use of different RPA tools varies and learning new tool may require trainings but usually, the basic idea behind those tools is the same and it quite simple to learn new tools if an employee knows already another one.

According to interviewee C, there are cases where the customer tried to implement the automation with two RPA tools in order to choose the better tool for them. However, this requires some excessive money in implementation and big savings in later phases are not guaranteed. Therefore, does not come into question for all organizations. What is more, usually this kind of experiments are confidential, so markets or other companies cannot utilize the test results.

What comes to the decision of automation model, front-end or back-end automation, the choice must be done carefully since interviews revealed that is even more important choice than used RPA tool. Usually, the big automation projects are utilizing back-end automation which company X is using in its almost all SaaS model implementations. Back-end model is more efficient and error tolerant in production, which makes the maintenance easier especially for large automations. If the front-end model is changed to back-end model within the project, it can delay the project schedule. However, this might be necessary if the wrong model has been chosen in the first place. Interviewee A states that people can have prejudices that RPA is like an assistant on a computer screen in front-end automations even if it is first and foremost an IT service and does many other things on the background as well. Otherwise all alarms, monitoring and fault tolerances are missing from the solution. Additionally, if multiple robots are doing single front-end automation, it can be that all robots are trying to execute the exactly same task. This is the reason why large processes are more prone to be implemented with back-end automation by company X. It is recommended by interviewee C that customer first utilizes back-end automation as far as possible than then implements front-end automation if still some automations are needed. Interviewee D foresees that the next automation wave is to deploy front-end automation more widely.

Quite surprisingly, all interviews revealed that the maintenance must be considered the most in the technological mindset in projects. Nowadays, the new ERP systems are more and more cloud-based applications in which micro updates are quite common, and it creates challenges for the automation maintenance. If interfaces are changed, robots are prevented to get their work done. The project can be considered

as failed if the changes caused by updates cannot be managed properly and promptly. On the other hand, customer can also have a too old system for automation if the ERP graphical user interface scripting, which makes automation possible, cannot be turned on.

All processes should be automated according to the common operating model in order to standardize the maintenance as much as possible. If the automation consists many small parts from processes here and there, maintenance can be difficult since a big picture is not born. The maintenance is something which should be considered and analyzed already in the specification and implementation phase since the maintenance in production phase forms a great share of automation costs, even 70 percent of automation according to interviewee A. The unexpected high maintenance costs can disappoint customer, make the automation unprofitable and cause the failure.

The worse implementation is done, the greater are the maintenance costs due to a large amount of exceptions and errors and difficulties to fix them. Investments can be wasted if maintenance is impossible. This scenario can be escalated when a party, which will not be responsible on the solution maintenance, has done it with attitude "not in my backyard" and implements the automation without proper investigation what will happen in production. Automations are more likely to be high-qualified if the implementer is taking over the maintenance since the implementer does not want to cause any extra work to itself. Consequently, an ideal situation is that the same company is both implementing and maintaining the solution. Despite these recommendations, if another party is still taking the maintenance role, the documentation and knowledge transfer for maintenance purposes is very important so exception cases and errors can be handled instantly. Nevertheless, proper documentation is important in all projects since only one person cannot be aware of the maintenance needs alone. This person can change employer, or the maintenance party can be outsourced or changed, and documentation helps this procedure. The comprehensive documentation also

supports and accelerates the beginning of new RPA projects since some elements from old projects can be copied.

Additionally, a proper testing of implementation is important. The errors in automation logic may not cause problems in smaller scale but mass data transactions in production system may reveal severe issues. One single successfully completed test case does not guarantee a successful and waterproof implementation. Interviewee C emphasized the ERP system stability can also be an issue – if the system is not stable enough, it can crash from mass data processing, and business processes are suffering. Therefore, it is crucial to execute relevant multiple mass data test cases already in the implementation phase before go-live. Customer must be aware of the need and require this and partner, on the other hand, must inform the customer if this is necessary. Especially business analyst must take the role in determining the test cases and helping customer to test.

4.2.4   People

Automation projects are relatively small compared to other IT projects, such as ERP ramp-ups, and unlike the literature review, interviews emphasized that this fact may cause issues for implementation partner allocations since its employees can have many small projects, even five to six, to handle simultaneously. Only very large projects make possible to concentrate on single allocation at a time. In order to avoid big allocation hassle, allocations can be done carefully. Situation in which one RPA partner employee's work contains multiple small projects must be avoided but sometimes this is impossible. The smaller RPA projects can be tried to be divided equally between members that all could have one bigger project and smaller project at the side. On other hand, usually developers have more to do in one single project. They might have one process in progress and another one from same customer in waiting list. They are more able to focus on certain customer's business. Developers must also be customer-oriented consultants and not only focus on developing.

Interview C emphasized that the roles of RPA architects and analysts are not so intensively concentrated on only one project, so they are often allocated on multiple customers, industries and technologies, and therefore, their job is remarkably challenging and requires good stress tolerance. They must keep themselves updated what is happening in many areas and change the customer into another multiple times in a day and they cannot usually plan their work beforehand. Additionally, some major incidents or other unexpected issues may take working time a lot. This leads to diffused work and it may be hard to focus on certain task when many issues are under progress. Stressful work environment can be a valid threat for project success if employees are feeling they are under great pressure or even get a burnout. It is under project and team managers' responsibilities to support the team and ensure nobody is exhausted or out of their depth and hire new employees if situation requires it.

One other threat in terms of project team is the turnover of workforce in the middle of project especially when job markets have a shortage of experienced RPA professionals. Then new employees must possibly be trained to their new roles with fast pace and this may cause schedule and budget extensions. If partner has changes in their internal workforce, they must do internal knowledge transfer for free since it is not under customer's causation. Consequently, the high turnover rate of partner is influencing negatively to partner's cashflow and balance. Even if this is not influencing customer's costs, this may prolong the schedule. The Finnish law for long notice periods relieves the handover process from employee to another.

Customer's turnovers are certainly also affecting – the new employees may start from scratch in area of RPA and clarifications from partner to customer must be started all over. The more influencing and responsible person is replaced, the larger threat it is. Interviewee B concluded that the replacements of project manager of either customer or partner are big threats for project success.

Since the RPA project can be very agile with duration of only one to six weeks, another big threat in people side according to interviewee D is sick leaves and other

mandatory sudden absences which is a risk for project success. The problem of developer has fallen ill can be relieved since RPA architects are usually experienced developers, and are aware of all developments, they can easily provide some back-up in development. The team roles should anyway be flexible in projects and people should not be too dependent on their own job, rather help their team due to the fast pace of projects. However, communication between all team members must stay at moderate level all the time that double work is not done. Without proper communication the project is in danger to fail.

Partner must also ask the customer's employees to participate the project actively – even if the automation is implemented with SaaS model, customer's business process experts, someone from IT department and project owner must be present. The customer responsibilities can be unclear at the beginning if it does not have any automation experience. Customer's top-level management's support and partner can support to find own responsibility areas. For example, partner can arrange some trainings for customer employees that they can develop their RPA knowledge.

4.2.5   IT Involvement

The need for automation projects originates from customer's business department, but the IT department's involvement is very important since after all, RPA projects are first and foremost IT projects, which some customers have difficulties to admit according to interviewees. The more customer is doing itself and has responsibilities on implementation, the more important is IT's role. If customer is also implementing and developing itself, IT department's role is significantly more remarkable, and IT must have broad RPA knowledge. Literature review diminished the importance of IT involvement in terms of implementation partner's success in projects. However, interviews show the opposite and reveal that the IT involvement is very basic element of project and therefore, makes partner's work possible by providing support and IT services. Many projects have failed without IT department's presence.

In the SaaS models, IT's role is small but consists of specially considering RPA solution's information security, continuity and reliability on which IT usually pays more attention than business department. Furthermore, IT can consider more holistic approach in company than specific business department which may only think only think their area, such as procurement or sales processes. IT's role is to ensure from IT's standpoint that business department gets real benefits from the project. If IT and business are not cooperating, partner must be a neutral party and can gently remind customer that RPA projects require also IT's presence and try to get all parties in a common meeting. However, it is customer's internal organizational issue and partner cannot get involved to it too aggressively. One option for partner is to report to customer's upper management about the issues and justify the need of IT involvement with case examples from other companies. Interviewee D mentioned that when the gap between departments has been too big, partner has even declined to execute projects in companies like these since the probability for failure is too high.

Since the emphases of business and IT may be so different, Interviewee A and B claimed that IT can make the project more difficult easily if they find the RPA project undesirable. Their requirements and expectations may vary from business requirements and can be totally in contradiction. The role of RPA partner is to clarify both requirements in the beginning and ensure that they are in line. If the requirements do not meet, partner is harming itself since both IT and business are impossible to be pleased simultaneously and either one is not happy to the solution in the end. Partner must insist that customer must first solve the conflicts internally before the project can start. This factor also proves that it is good to have customer project owner or responsible party since it can determine the common requirements and supervise the common good.

The IT setup can be the biggest uncertainty factor at the beginning according to interviewee A. One good example of the controversy at customer side is whether robots are allowed to receive access rights to systems or not. The proper start of project implementation can exceed, and this can cause operating losses for

implementation partner since partner's employees have to be in standby mode and being prepared to start the implementation but there are still some inconveniences and obstacles from the customer side.

4.2.6   Project Management

Company X usually divides the tasks of a project manager in two pieces – a technical project manager which is usually the architect and then a business-oriented project manager which is usually the RPA analyst. They both can focus on the project management area where they are good at, and therefore, false estimations or project manager's lack of knowledge are more unusual. The literature review highlighted the fact that project management can be challenging if the project manager does not have a technical understanding. This work division abolishes this problem.

Interviews emphasized that if RPA partner is participating in the budget and schedule estimation, they usually are well-estimated, especially if the partner is already familiar with customer's policies, ERP systems and processes. The developers should also participate in the planning phase since they can estimate the incoming workload for development and can schedule the project according to that. The customer budget must include the RPA software license, implementation and especially maintenance costs as well as possible trainings and other operating expenses. The profitability of the automation can be evaluated with the payback period. To emphasize the issue even more the business case can be evaluated incorrectly if the payback period is counted only by cash flows from saved manual working hours, since automation can have many other advantages, such as the decreased amount of errors. The significant role of maintenance costs must be highlighted since the maintenance causes costs continuously in production.

Customer may insist partner to implement a project with fixed price basis. The partner should in almost any cases to decline and persuade the customer to have hour-based invoicing since these cases are most likely to fail financially. RPA

projects contain also process consulting and workloads are dependent on the implementation model. What is more, everything cannot be foreseen and for example, some major issues, problems or bugs in the ERP system may occur, and these must be bypassed, and it may take time. When the schedule exceeds one week, also costs are increasing.

Customer's responsible person must also be actively part of the specification because the main reason for exceeding budget and schedule is usually the lack of specification and requirements in the beginning. The most difficult issues in project management at the partner side are the incoming requirements and setups from the customer side since customers do not always know what is achievable. The projects can be performed with routine, but customer-specific issues can cause some barriers. The time used in implementation is usually the most discussed topic with the customer, especially if the partner is also maintaining the automation. As explained before, the importance of maintenance cannot be overestimated. Automation must be implemented carefully to decrease the need for maintenance, and sometimes this can be time-taking. Interviewee C states that customer has sometimes difficulties to understand the realities of time-taking but qualified implementation. Partner must explain this issue thoroughly to the customer and justify this with decreased maintenance costs. After all, implementation costs are still lower than maintenance costs even if lots of time has been used for implementation.

If the budget is exceeded, the customer finds important the reason why the costs were increased and how it is explained. According to interviewee B, the customer is usually ready to be flexible if the budget excess is influencing remarkably to the final solution. If the customer is doing the project in earnest, small drawbacks are almost irrelevant since the project has already demanded lots of resources, money and time, and there is no reason to withdraw.

4.2.7   Process Maturity

Proper specifications and evaluations of processes are done at the beginning and especially partner's business analyst has an important role in this step – they can support customer to find the suitable ERP processes for automation. Additionally, the customer has unlikely done it before, but the partner may have experiences from many similar processes and automations. The most important issue in process maturity is to clarify the automation potential and calculate the business case how the process automation is affecting on customer's business metrics and compare it to set objectives. How often the process is running, how long it takes by human or is it even done currently are questions which must be asked in evaluating process maturity. If the automation does not result in reaching the desired goals, the processes are not mature enough to be implemented. A comprehensive and large-scale analysis on many processes must be done since some additional processes which customer may not even have thought about can be automated at the same time. For example, the customer may want to automate some purchasing processes, but the analysis proves it is useful processes in sales as well. The whole process should be evaluated to solve the maturity for automation – not only parts of it. Automating only small parts of the process does not gain significant benefits and it creates difficulties for maintenance. The process maturity is not only analyzing the possible processes; it is also mapping the processes and considering which is the best option to automate them since the RPA is not the only existing solution. The processes and their characteristics also determine the technological solution how the implementation is done – is it even RPA. The process analysis must be done carefully to avoid using unsuitable technology.

Partner's job is also to provide realistic information about what RPA can really do. Customers, which are not familiar with RPA, can consider that RPA is replacing all manual work, or it is not capable on almost anything and these prejudices can affect negatively on the project scale – it can be too ambitious or small. However, according to interviewee A, nowadays the possibilities of RPA are quite known for customers since many of them have already utilized RPA before. The object is

currently to encourage customers not to be limited only on RPA since there are many technologies and possibilities which could be utilized in business. Utilizing many technologies simultaneously can help to pass the restriction of a single tool and get a more comprehensive solution for fluent business.

Partner must check the process maturity as systematically as possible in order to avoid surprises in later phases, but everything cannot be exactly solved. Some assumptions in process evaluation are always needed to get a holistic picture on processes. Interviewee D mentioned that best practice to find suitable processes and check their maturity is so-called top-down approach. Firstly, strategic level or top-level management must decide which are the business areas which are needing the automation to improve the desired business metrics. The bigger the area, the bigger is the potential. The strategic level will also confirm that those areas will not be changed remarkably during the next few years since the automation would then be useless. Secondly, the tactical level of organization involves the process owners which confirm the automation areas presented by strategic level, presents the processes, real pain points and desirable business metrics in these areas. Finally, the way of acting of employees at the operational level must be followed since they all can have different ways to work. Partner must observe employees and start to build the automation in a way which covers all ways of working. There can be sometimes a need to change the employee's way of acting and this must be done through customer's tactical level management since the partner cannot change any customer's policies itself. The tactical level must confirm that assumptions made in the operational level are correct. Processes are mature if the top-down approach is passed successfully.

If the process maturity evaluation was started from the bottom, the operative level could hand over wrong processes for automation. Processes may not have the real potential or business case for RPA purposes. What is more, operational level is the largest one, so they do not have the big picture on the organization so their proposals may only reduce their own manual work and not bring the real advantages of RPA which are organizational level benefits. There is no guarantee that those processes

are still valid after a while if upper management has decided to make changes on those. Therefore, the top-down approach with correct order are very important.

If the process is illogical or broken, it is not worth of automation until processes are repaired. The fixing is not under partner's responsibility unless the customer asks and provides project extension to do it. However, small improvements and changes to processes are usually necessary and useful – the RPA is consequently more suitable and provides more value, and this is definitely a service which partner should offer as a part of project. When processes have been changed more suitable for RPA in the beginning, the rest of the project goes proficiently and there are no interruptions for implementation from the process point of view. It is crucial for partner to understand the purpose of the process and its way of function, as well as how it should work in the future as automated. Partner's ERP knowledge can simplify their work and accelerate the project especially in this step.

5   DISCUSSION

The most important issues which were raised in the analysis chapter are discussed here. The purpose of this chapter is to provide a big picture of project success and highlight the most crucial facts based on conducted interviews and literature review. The most important critical success factor based on the interviews is the strategy since it determines the frames for the rest six success factors and influences almost all project actions. What is more, the strategy is the issue which is prone to fail most easily in projects. Firstly, when a need for automation appears in the business department, the company must recognize its own capabilities and skills on automation and decide the used partner model according to that. Suitable partner must be found already at the beginning if the partner is needed. The partner can give support and advice in the strategy determination.

The strategy should contain a remark that customer organization is represented broadly, which means IT department is also part of the project. One biggest threat to success according to all interviewees is the lack of IT involvement. This success factor is not raised to most important success factors since in partnered implementations only IT's presence and support are required but they are released of technical skills. However, the success factor must still be there – if IT department is not participating in the project, it means failure for most of the cases. The larger role end-user organization has in the project, the bigger role its IT has. Additionally, the business department certainly must be involved as well as top-level management of the company. The top-level management is responsible for nominating the owner and taking care that the project is chasing company-level objectives, not the interests of a single team.

Next, the organization must calculate the business case and decide the used operating model. The possible automated areas must be mapped – what is done currently and what will be done, and according to that ambitious objectives must be set – improving certain key performance indicators, which is more beneficial and recommended, or decreasing full-time equivalents, which can be risky. Some

assumptions on processes and potential benefits are always made in the planning phase. Consequently, the objectives are not solid, and they must be changed according to the first implementations. Many companies are too committed to the same objectives too many years and therefore the whole potential is not utilized. The project can seem to be successful in the end but when it is considered as an entirety, the project could have had potential to benefit the company much more if something supplementary had been done. The impacts of implementations to the business metrics must be evaluated, and KPIs must be changed or added according to the results. The keys for project success must be determined beforehand – it is not only achieving the objectives; the objectives must be ambitious enough to provide value for the business. Additionally, the benefits must be larger than costs and ROI must be reasonable. The success is also how the solution works technologically – how much maintenance is needed for fluent production.

The first implementations show how the automation itself is technologically working and is it intelligent enough. The used technology or logic can be changed on following processes to a more suitable one according on the results on first implementations and processes can be added if the automation is perceived as good. If these crucial issues are not met or done, the project is likely to be unsuccessful. A very common reason for strategy unsuccess is the lack of objectives, specifications and common meetings at the beginning.

The strategy cannot determine the used technology at first. RPA is not always the best solution and there can be the other way to implement the needs, for example, process optimization, system integration, artificial intelligence or simplest by utilizing all ERP system features and settings. Therefore, projects should never be technology-based and should start instead always with a problem-based approach. The business consulting must be made to analyze the processes, systems, desired outcomes with top-down analysis and consider the solution and used technology after that. The choice of RPA tool can be decided last since the used ERP system does not affect the choice remarkably and all RPA tools are possible technologically and details which are affecting the choice are small but still significant.

If the project is implemented with RPA, when it should not, a lot of supplementary work must be done, and the solution can still be unsatisfactory or unusable. Consequently, RPA pure players or pure IT consultant companies may not be the best choice as implementation partners – partners must have insights from the business standpoint as well. Holistic multinational IT companies with local presence with an opportunity also on offshoring the work are the safest choice for customer in terms of project success.

Interviews revealed that if the customer does not have any knowledge on RPA, the relationship between customer and partner must be established on trust. Customer can be out of their knowledge area and they let partner get into their business processes. Customer must not only believe that partner is professional and does good automation but also that partner can give the best recommendations and knows customer enough to customize the automation as suitable, sustainable and qualified for specific needs. Partner must certainly fulfill these expectations and convince the customer about skills and knowledge. It is crucial for project success that partner is taken part to the project from first specifications, and customer is open-minded, so partner has good visibility to customer's business, organization, policies and ERP systems. If the partner cannot influence the specifications, the project can fail. Since partner has so strong responsibility and role in implementations, it is another one of two very important critical success factors.

If the customer has some internal problems in the project, or it has false assumptions on RPA, partner's role is to remind the customer about facts, but partner should not be too offensive since it is customer's own business and partner should not get too involved to it since the customer can be offended. They have a customer-vendor relationship which is based on a negotiated contract and it can be even withdrawn if the customer does not feel comfortable. In the case customer is having internal issues, partner can try to book a meeting with top-level management and justify the need for change by case examples. Interviewee D mentioned another way is to take a temporary resource, automation lead, from partner to customer side. Automation lead is only reporting to upper management about the situation of the project. Upper

management is more prone to set the project back on track and let partner help on internal issues.

Due to the agile nature of RPA projects, the customer must be able to make decisions fast without procrastinating. It is recommended that partner has clear channels how and who to contact when decisions are needed. The model which requires a decision from many people or multiple parties is not the best one, it may delay the project. Fast decisions from customer require fast responses from partner to continue the project promptly. Additionally, it is important that difficult issues can be discussed instantly, and customer is able to share thoughts and provide transparency to their business. If all relevant information is not shared, holistic understanding is not received, and partner has only small visibility on customer's business. Improper understanding leads to a situation where nobody is satisfied, and the project is likely to fail.

Even if the specifications and implementation are done successfully, it does not mean that the project is successful in the end. Some problems can appear as late as in the production phase, such as maintenance issues which must be focused more in the implementation phase to let the project succeed. Partners have usually experience on maintenance more than the customer – therefore, their role is very important to prepare the implementation ready for easy maintenance. Automations should formulate a clear entirety and not be consisted of small minor parts from here and there because it is only complicating the maintenance and not automating the whole process so manual work is still needed. Incidents occurring in maintenance must be able to be solved in the agreed time, otherwise, business is disturbed. The maintenance phase also requires clear roles between partner and customer; to whom the incident is assigned to be fixed and who is informed at the customer side. As all interviewees highlighted the importance of maintenance, it has become a very important element of success.

The automation can be done with shortages and tested incompletely without mass data loads, which cause errors in production if rules do not apply to all process

cases. Moreover, the ERP system can be unstable to be utilized by robots which require a stable environment to work. It can crash and cause significant problems in constant business when robots are not able to their job. The business case can also be revealed to be smaller in real life than it was evaluated in the planning phase. This could be avoided by following interviewee D's advice to change the objectives after first implementations and seek for alternative and additional business metrics than initially was considered. Furthermore, leaving marginals to calculations at the beginning can prevent the situation where automation is unprofitable in production.

A failed project is usually conversely successful project – usually, there is no one, exact reason for failure, but the entirety is failed, or some sort of domino effect has happened. The reasons for failure must always be analyzed deeper. It is incorrect to assume that technology is not mature since technology is rarely the cause for failure according to interviewee A. Additionally, if the project seems to be unsuccessful, with proper error analysis and hard work it could be turned into a functional one. RPA projects require investments so giving up or quitting is the worst choice since time and money have been wasted for nothing. Unsuccessful projects are at least somehow useful – companies can analyze the reasons for failure and try to improve in next projects. The successful projects have usually also something small which can be improved in the future so continuous development is important.

Even if some critical success factors are more important than others, all of them still must be considered to succeed in the project. Multiple minor issues can accumulate and cause severe problems. This study had also some limitations; reasons for failure are easier to recognize than to find exact reasons which are leading to success. Success can be hard to measure – is it only reaching objectives or also something more. The line between success and unsuccess is ambiguous and various people can consider issues differently. The results of this study may not be universal and apply only on company X and its customers since the study is based on own insights of interviewees and analysis of writer.

6   CONCLUSIONS

Robotic process automation and its critical success factors in projects are not widely academically researched currently. The purpose of this thesis was to expand the understanding of characteristics of robotic process automation implementations in enterprise resource planning systems and find the most critical success factors and what may potentially cause the failure there. This chapter explains the conclusions made in this thesis.

The most critical success factors for RPA implementations are strategy and implementation partner. A relevant strategy is crucial since it is the foundation of the project and determines the features and details of other critical success factors. As a part of the strategy, the project objectives must be defined. Project objectives describe the economic profitability of the project. The most beneficial and recommended objectives are improving company business metrics rather than reducing manual work which is not usually a profitable objective by itself. After few implementations the objectives must be changed according to the real changes in business metrics since the preliminary objectives are not usually the final ones. If objectives are not defined, are not able to be measured or they are set incorrectly, the project is most likely to fail to due to lack of clear direction. The customer's project owner must be responsible for setting the correct objectives and partner can support this action.

As a part of the strategy, the common operating model must be created which ensures that all parties in the project are having the same requirements and ways of working. Common meeting at the beginning can be a good way to ensure the common policies. Customer's problems and requirements in order to gain benefits in business processes must be first determined together with all parties. Only after that, the technological solution is decided. The best solution is not always RPA, it can also be other technology, system integration or modification. Therefore, an automation project should always have a problem-oriented approach.

The strategy also forms the model whether or how to use implementation partner in the project. The implementation partner is important as well since it has strong responsibility and project success is dependent on its knowledge and capability. One very important characteristic of partner is capability also on business-centered work. The partner should not be only pure IT or RPA player since RPA projects require also knowledge on ERP systems and process functions as well as skills to understand the customer and its requirements. What is more, the best solution for customer's problem and requirements may not be even RPA, it can be also other one, for example, other technology or ERP system integration. Therefore, the partner should be able to provide multiple services. Customer must consider possible partners' capabilities and skills carefully when choosing the most suitable partner. Furthermore, the customer must trust totally on partner and its skills in order to gain maximum benefits from RPA since usually partner has wider knowledge and experience on RPA than the customer does.

One possible and frequent reason for project failure is lack of customer participation. Upper management and business department as well as IT department, even in Software as a Service model, must be present in projects to support partner's work and set co-operationally specifications for the project which utilizes the whole organization and supports to improve business metrics in a corporate level, not only in single departments. The active and collective involvement from customer supports partner to get answers fast and helps to proceed in implementation.

The project can be a success otherwise but maintenance difficulties in production phase can turn the project into unsuccessful. The maintenance must be considered already in planning and implementation phase – the automation must be implemented in a way that maintenance is easy, and it does not cause excessive costs in production phase and eliminate the business case. The customer should consider a model where the same party is both implementing and maintaining the solution since it reduces the need for knowledge transfer for maintenance purposes and maximizes the quality of implementation. The partner should use its experience

from former projects to make the maintenance as fluent as possible since customer may not have any previous experience in RPA maintenance. The frequent software updates on cloud-based ERP systems create challenges for maintenance currently. In any case, the maintenance forms the major share of automation costs so reducing costs there is important.

In the future studies, the robotic process automation implementations must be more researched to improve the succeeding rate of RPA projects since most of the automation projects are currently robotic process automations. As a standard model for RPA implementations is not developed yet, it could be developed to make implementations more fluent. It could unify the project path from planning to maintenance and the characteristics of provided service models, for example, SaaS or license reseller, and guarantee that customer knows exactly which services to receive and help partners to standardize their offerings in markets but differentiate if necessary.

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APPENDIX: Interview questions

1. Interviewee background and experience
   a. What is your job position?
   b. How long have you worked with RPA?
   c. Have you worked in another job position in RPA field?

2. RPA strategy
   a. Think about successful projects, how the following issues are affecting: how technologized is the customer, ambitiousness of the strategy, previous experience of customer in RPA implementations? Consider the aims of the projects: replacing manual work or doing completely new work?
   b. How these issues may have affected in unsuccessful projects?

3. RPA implementation partner
   a. In successful projects, what was the role of partner? What did the customer do by itself or how was the work split between partner and customer?
   b. How these issues may have affected in unsuccessful projects?

4. RPA technology
   a. Was it front-end or back-end automation? Which RPA software was used? How did the used ERP product affect?
   b. How these issues may have affected in unsuccessful projects?

5. People
   a. Which kind of teams in customer and partner side? How educated people and RPA aware people in customer side?
   b. How these issues may have affected in unsuccessful projects?

6. Process maturity
    a. Is the ERP process regular or remarkable big? Does it take long time to do manually? How this was considered before project?
    b. How these issues may have affected in unsuccessful projects?

7. IT involvement
    a. Were the requirements in line between customer IT and business department?
    b. How these issues may have affected in unsuccessful projects?

8. Project management
    a. Which was the role of project manager (purely business or also technical)? How did the project meet the schedule? Was the budget estimated well?
    b. How these issues may have affected in unsuccessful projects?

9. Overall evaluation of the project
    a. How to measure project successfulness? What is the most important success factor? Which is the most difficult to manage?
    b. Think about failed projects: why do you think they failed? What are the most eager parts to fail? What would you do on other way at the moment?

10. Comments
    a. Do you have anything to add?