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Benefits and Risks Measurement Model

In different managerial positions during RPA implementation

Master's Thesis in Governance of Digitalisation
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Abstract for Master's Thesis

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Abstract:

The emergent technologies have always been used for ameliorating business processes. Automation solutions and use of AI tools have increased the creation of more efficient and reliable processes. One of these automation solutions is robotic process automation that is used to automate software-based processes. Use of software systems have previously required human attention to work on different graphic user interfaces to read, fill, and combine data among the systems. Robotic process automation solutions offer a new way of working by automating repetitive manual tasks and creating more time for human work force to be creative.

Implementation of modern technologies has its benefits and risks on various levels of the organisation. Change and adoption management is crucial to be up to date so the value from the implementation process can be captured and risks avoided in every position. Various measurement metrics and tools can help the management to monitor the ongoing process and to evaluate the outcome of the implementation. The aim of this thesis is to categorise the perceived benefits and risks of robotic process automation and the measurement metrics and tools to monitor them in different managerial positions during the implementation.

The methods used for creating this categorised model are literature review as secondary data to create a theoretical model and a survey to industry experts to gather primary data to agree or disagree with the created model. The secondary data was researched to gather knowledge about different known benefits and risks models while trying to position their categorisation into project manager, developer, and customer service agent positions. The primary data gathered from the experts on the same managerial positions was used to strengthen the theoretical model. As conclusion, the final model represents the perceived benefits and risks under the managerial positions and measurement metrics and tools in general.

The results show that the benefits and risks of robotic automation process implementation can be categorised under managerial positions to help the management to ensure the full value capture while ameliorating the business processes with the automation. Taking the categorised benefit dimensions and risk concerns into account during the implementation's change management can help the organisations to be ready for the more advanced artificial intelligence solutions as the robotic process automation is referred as a steppingstone towards the forthcoming technological revolution.

Keywords: RPA, benefits, risks, adoption, implementation, measurement metrics

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Contents

List of Abbreviations

AI	Artificial Intelligence
ANI	Artificial Narrow Intelligence
API	Application Programming Interface
ATH	Average Handling Time
BPA	Business Process Automation
BPM	Business Process Management
CRM	Customer Relationship Management
DSRM	Design Science Research Methodology
EU	European Union
FTE	Full Time Equivalent
GDPR	General Data Protection Regulation
GPT	General Purpose Technology
HR	Human Resources
IPA	Intelligent Robotic Automation
IT	Information Technology
KPI	Key Performance Indicator
NLP	Natural Language Processing
OM	Operational Management
RDA	Robotic Desktop Automation
RPA	Robotic Process Automation
SAFe	Scaled Agile Framework
TCE	Transaction Cost Economy
UI	User Interface
UTAUT	Unified Theory of Technology Acceptance and Use of Technology

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1 INTRODUCTION

Customer service is at a turning point, as technology moves forward and gives customers faster, easier, and more adaptive answers on the 24/7 basis through chatbots, recorded call answers, and always open service lines. Many of these means are backed with small automation processes to reduce manual human labour. The manual labour is often costly for the company and dull for the worker. Hence, digitalisation has created different solutions, one of them being robotic process automation, RPA, to reduce manual repetitive tasks, so that human creativeness and innovativeness can bloom for good of the company and the worker.

These manual repetitive tasks could be searching for the same information about every customer, for example, address to check the possibility for offering a broad band, or to see that all the subscriptions still have active contracts for the future. This constant search for information can become very "automated" for the worker, but it still is something that involves multiple buttons to click, copy-pasting of information and data from here to there, and to be continuously alert or avoid errors, such as mixing up the customers' information. RPA tools aim to automate these kinds of tasks for good, for example, just opening a customer information page would start the process to check available broad band connection, or ending contracts, freeing time and concentration of the customer service worker to interact better with the customer.

These robotic automation processes can be adjusted to start also with direct command from the customer. For example, calling a customer service line for missing PUK code the solution can be found from the voice menu, and when the right number is pressed, the process asks the needed credentials and proceeds to open customer information, search for the PUK code and send it to the customer via email. Another example could be automated chatbot answers, where a customer receives pre-written answers that are triggered with key words, and from these answers the customer could, for example, start the process to cancel subscriptions without opening a chat with a human customer service.

RPA tools can ease customers' and customer service workers' life markable and create benefits for the workers and for the company, but it involves risks too. If some of the processes stop working due technical issues, i.e., something in the background legacy system is changed, new products are introduced, or user input cannot be read, the process must be done manually. When

these tools have been in use for a long time, the company has already reduced workers from those types of manual job positions, so going back to manual processes will slow the service process. Or if the RPA tool makes errors, mixing up the customer details, but as being a trusted part of company's processes, it may take a while before someone will notice the errors that the robot has produced. Hence, companies need to be aware of different kinds of risks when moving towards the more digitalised organisation.

This thesis will aim to create benefits and risks measurement model which could be followed when bringing an RPA tool to customer service and ensuring the perceived benefits are captured and evitable risks are avoided. It aims to categorise there benefits and risks under different managerial positions, such as project manager, developer, and customer service agent, so the implementation process can be followed separately to ensure the value capture.

The work will introduce the definition of RPA, the different benefit and risk measurement models, and how they can be positioned under managerial job positions. Then the created theoretical model will be evaluated by creating a survey to industry experts within the company the author works for. Then the theoretical model will be adjusted with the survey results to form concluding final model, which can be used by the practitioners and academics for better monitoring of the implementation process and for further research within the RPA literature.

"Truly unique events are rare … All events but the truly unique require a generic solution" – (Drucker, 1967)

1.1 Objective of the study

As digitalisation proceeds, it will develop business at exponential speed (Moore's law) by offering more affordable and reliable solutions that can produce manual repetitive tasks more quickly than human workers can. This will free time for human workers, so that they can focus on tasks that require more cognitive decision-making or empathy, which cannot be processed with modern day AI technologies at a level that it would be suitable to serve customers or end-users in many industries. RPA can be seen as one solution to automate these tasks and with the help of AI technologies, it can be resilient to minor changes in the working environment and in the background processes. RPA has raised interest in academia in recent years which is presented in

the number of research papers and studies created in the area. Researchers have covered many areas and research problems about the reasons for deploying RPA, implementation plans, and which benefits can be reached through this new technology in various industries ((Siderska, 2020), (Syed, 2019), (da Silva Costa & al., 2022), (Jalonen, 2017)). In addition to these research papers, various white papers and case studies have been published by industry experts and consultancy agencies. Most of these discuss the reasons and justifications behind the rising usage of RPA, which financial and non-financial benefits it can bring to the organisations, and how it should be deployed from the technical and managerial points of view ((Jalonen, 2017), (Shome, 2017)). There remains a research gap between practical usage and academic literature even if the perceived benefits and known risks are mapped, there has been no research on how these benefits and risks can occur on different managerial levels, and how they should be measured to ensure the best results at each level of the RPA implementation.

This study aims to clarify the types of benefits and risks that are recorded in the previous research, how to measure those ex-antes, and it conducts a survey on which benefits and risks are expected in different positions. Adding this primary data as new knowledge, the aim is to create a model to measure the most important benefits and risks when implementing RPA into a company´s business processes and to see how the adoption of technology can help to capture the value of the implementation.

Research questions:

RQ1: What kind of perceived benefits are seen on different managerial positions during the RPA implementation?

RQ2: What kind of risks are seen on different managerial positions during the implementation?

RQ3: What kind of metrics should be used to measure these benefits and risks in different positions?

The researched questions were based on the research gap concerning how the perceived benefits and risks of the RPA implementation can be seen in different managerial positions within the organisation. The previous academic work has been setting frameworks and models for the overall value creation and capture, benefits and their measurement, and assessment of known risks within

the automatisation process without further placing these gained benefits or known risks into specific positions in the organisation. Their placement could ease the work of the management on how the implementation process should be communicated or how it can be managed in different levels of the organisational governance. The research questions aimed to answer this research problem and to give possibility of new innovations under the terms of perceived benefits and perceived risks in different positions. Finally, the purpose is to construct a model that could be followed by the researchers or practitioners to ensure the best possible adoption of an RPA technology into the organisation and offer possibilities for further research. Further research could be considering more profound aspects of specific position and how it can affect the overall implementation process, or the adoption of RPA.

1.2 Structure of the Thesis

This study is composed of seven chapters. This current chapter provides a brief introduction the topic and presents the research problem and questions. The rest of this thesis is as follows:

Chapter 2 provides theoretical background on the RPA and related concepts. The chapter discusses about the possible AI augmentations within the RPA framework, and then proceeds to represents the known benefits, risks, measurement metrics, and risk mitigation tools related to the subject.

Chapter 3 presents the theoretical model created to measure both benefits and risks that are related to the RPA implementation within three managerial positions. This theoretical model is one of the research goals that must be obtained to answer the research questions.

Chapter 4 provides information about the methodology used in order to create the theoretical model, and which type of tools were used to gather the theoretical background for this research.

Chapter 5 presents the survey and discusses how it was created and how the target group was selected. The latter part of the chapter includes the analysis of the results gained from the survey.

The two final chapters conclude the research. **Chapter 6** discusses the theoretical model and compiles it with the gained survey results. Also, the possible research limitations and considerations for future research are described. The chapter also present the condensed answers to the research problems. **Chapter 7** concludes the research and presents its main findings.

2 THEORETICAL BACKGROUND

2.1 RPA – Robotic Process Automation

RPA, Robotic Process Automation, is a software technology that is made to mimic human actions to save human workforce from repetitive manual digital tasks, to prevent human errors, to make these tasks faster, and to free people for more creative and innovative tasks. Streamlining workflows can create multiple benefits for the company, financial and non-financial. Even that the name gives away an impression that the process uses a highly manufactured robot, it is more of a set of well-produced coded steps that a computer does to execute various tasks it has been given.

Robotic process automation works using software user interfaces, UIs, to process data like the human user would do normally. Hence, RPA's implementation with the other systems takes less effort and costs than creating completely new systems and structures for specific tasks, as the RPA tool can use the same interfaces as human workers, without creating any new heavyweight structures and gateways between the software systems. (Syed, 2019) This ease of implementing solutions to streamline business processes has guided many companies to use an RPA approach as their main automation solution (Information Services Group, 2018).

Gartner defines RPA as "a productivity tool that allows a user to configure one or more scripts to activate specific keystrokes in an automated fashion. The result is that the bots can be used to mimic or emulate selected tasks (transaction steps) within an overall business or IT process. These may include manipulating data, passing data to and from different applications, triggering responses, or executing transactions." (Gartner, 2023) These scripts and tasks can be in a physical or in a virtual environment, in both the machine works under the same regulations, with the orders and rules given by a human. This study mainly focuses on the virtual environment, where the machine helps the human by mimicking steps to execute dull and machine-like administrative tasks ensuring that no mistakes are made, and no rest is needed.

RPA has various slightly alternating definitions whether it involves AI, Artificial Intelligence, by standard, or whether it includes also the physical industrial automations used in factories. This study will focus more on the virtual RPA with some AI characteristics that can help the RPA

solutions to follow written and observed logical steps, which can qualify as AI under a specific definition (Casey, 2019). Deloitte suggests that RPA is a combination of AI and automation: "RPA, a synonym to AI, is the application of technology allowing employees in a company to configure computer software or a 'robot' to reason, collect and extract knowledge, recognize patterns, learn and adapt to new situations or environments." (Laurent, Chollet, & Helzberg, 2017).

RPA is not able to learn by itself, it needs human interaction to change the algorithms. For example, when there is a change in a legacy system or in its user interface, in which RPA is working it needs to be readjusted to this change to work as intended (Casey, 2020). AI, however, could be taught to spot the change and readjust the process to achieve the wanted results, some researchers go as far as to argue about the possibility to use AI and machine learning to learn about the existing systems and then create a RPA solution to work on the suitable business processes (Goyal & Singh, 2021). This is also backed by (IBM, 2023) arguing that the difference between RPA and AI is caused by RPA being process-driven while AI is data-driven. This means that AI intends to mimic human intelligence and RPA human-directed tasks, so use of AI can help to minimize human intervention within the RPA. Hence, an RPA tool augmented with AI solutions is becoming a more standard definition. RPA process can be assisted or unassisted, meaning that it can be started by human interaction or by a defined activation element, such as receiving an email (Burgess, 2018).

AI technologies like deep neural networks, such as NLP, Natural Language Processing (Gartner, 2023), or computer vision (IBM, 2023) can help RPA tools to achieve their tasks in a changing environment. AI embedded RPA can be defined as IPA, intelligent robotic automation, where fewer human interactions are needed to create and supervise the bot. In this research this definition belongs under the definition of RPA, even they would have AI extensions. These kind of RPA solutions fit to (Kaplan & Haenlein, 2019)'s definition of AI in the lowest level of their three levelled maturity framework for AI. ANI, Artificial Narrow Intelligence, is defined to be automation that is capable to out-perform human in the specific area, but not capable of autonomous learning of solving problems on the other areas. For example, RPA solution that is filling and reading data into legacy systems with the help of computer vision to locate the specific fields, is capable to fulfil the given tasks even there would be minor changes in the user graphic

interface, but if it would be asked to fulfil same functions on different system it would need of human guidance to specify the fields to read and fill. (Kaplan & Haenlein, 2019) define this border in their study followingly: "AI is broader than machine learning since it also covers a system's ability to perceive data (e.g., natural language processing or voice/image recognition) or to control, move, and manipulate objects based on learned information be it a robot or another connected device." (Kaplan & Haenlein, 2019).

According to these definitions, depending on the RPA's maturity and how it is used, it can be categorised as a certain form of an AI tool, but is more regularly regarded as an expert system or an automation application or tool. Another similar automation tool is RDA, robotic desktop automation. It functions mainly under same principles than RPA but have some differences on the scope of automation and human usage. RDA is for single user, good steppingstone towards more advanced automation like RPA or RPA with IA, also called hyperautomation by (Eshghi, 2023). RDA shows the benefits of the automation processes to single user, as they might even have the chance to modify the processes themselves to suit their own needs and workflows depending on their work position (Cretoi, 2021). RDA and RPA have difference of what extent the process can be automated. RDA can be regarded as less mature version of RPA. RPA is the more advanced tool giving opportunities to automate more complex and longer processes, especially when augmented with AI tools like NLP or computer vision. As these similar automation processes can be often mixed, this research compiles them under the wide definition of RPA. Both produce similar benefits for the user or the user group, and both have similar risks for the management and development, just in a different scope.

As a conclusion, this study regards RPA as a tool that is a logical extension to the organisation's business process management. It ameliorates and streamlines the business processes with the help of well-coded software robots, that can be augmented with AI tools to enhance their capabilities to read and record data on user interfaces while processing autonomously the given business process. RPA can function without these AI extensions as many studies conclude, but their presence in the automation is starting to be de-facto standard in the industry.

2.1.1 AI and Intelligent Automation

The traditional RPA process is presented broadly above, but the effect of the AI tools is to be considered as well. The most common AI tools cited with RPA are machine learning, natural language processing, and computer vision (IBM, 2023). For better understanding how these tools can be used within the RPA processes, they will be defined in following paragraphs with examples.

Machine learning helps computers to imitate and mimic human-like behaviour by transferring human interactions to data that can be used to learn and develop the chain of actions in the future. It has been originally related to be a statistics or mathematical optimisation tool for making predictions via computers. This background has been recently discovered to be useful for high complexity problem solving that AI can use to determine the chain of actions in the real-world problems (Alzubi & al, 2018). By solving complex problems and being able to learn from previous actions makes machine learning good to create complex deep neural networks, that try to mimic human intelligence. As the machine learning process goes further it gathers more and more data, which it uses to train itself better system within the given parameters. Hence, machine learning builds the background for many modern AI tools and is one of the emerging technologies that businesses are taking into use to increase their performance (Brown, 2023).

Natural language processing is computational linguistics model that is based on rules set by given data set or a human (IBM, 2023). The model gives computers the ability to understand human language as it is spoken and written. Before the data is given to the program producing NLP, it is pre-processed into code input that is interpretable to computers. After pre-processing NLP searches for connections within the input and produces the wanted recommendation, summary, or action. The actual process can be algorithm based on rules, or in more advanced cases on machine learning. NLP can be used to analyse data similarly to human behaviour to notice different styles, wordings such as abbreviations and synonyms, and context-based meanings, reducing manual human labour (Lutkevich & Burns, 2023).

Computer vision enables computers and other machines with the ability to see and interpret images. The interpretations then lead to actions and decisions for example to be used as navigation tool for autonomous robot. As the vision is to be regarded as one of the most important parts of intelligence, AI tools have been adjusted to be able to see and figure out what different image files

consist of (Learned-Miller, 2013). This ability has been made possible by comparing pixel colours within the image data with each other to create an interpretation what the data can withhold. Different types of detector models are established to be able to recognise images with text, to differentiate patterns and areas, and to recognise for example the characteristics of human face. The computer vision can work with a set of rules, or it can be conjoined with machine learning algorithms to be able to learn continuously without human intervention (Wiley & Lucas, 2018). As modern images are extremely accurate and may contain tens or even hundreds of megapixels the computer vision system lacks performance compared to human vision but can be taught to be continuously more precise by help of machine learning algorithms to recognise patterns within the data.

Together these AI tools can help the robotic process automation to be more autonomous and work on its own. The more they are being used the more inscrutable the automation systems develop, while being able to process tasks increasingly in human-like manner. This adds as risks in the implementation but also increases the benefits gained from the process.

2.1.2 RPA in Action

Robotic process automation can be defined as being part of business process management and business process automation. It is considered to be the lightweight version of BPA, business process automation. BPA often requires costly changes to back-ground software systems and even to hardware but offers higher computing power and, therefore, higher efficiency when processing automated tasks for the organisation's needs and is considered as a heavyweight solution. (Penttinen & al, 2018) compare these two options in their research paper, and create coherent concepts about light- and heavyweight IT solutions, which both have their time and place, and in their research, RPA is seen also as a gateway or a bridge towards more complex automated solutions (Penttinen & al, 2018) or as a logical extension of the existing BPM implementation (Shome, 2017). This lighter nature of an RPA solution can be found in its characteristics, such as working on top of existing software systems, making it deployable even for a company without in-house IT knowledge at all, which leads to more business-driven automation solutions (Doguc, 2020). These characteristics of having more easily seen value propositions and lower effort of

deployment are also mentioned by (Shome, 2017) when comparing RPA to business process automation options. The compatibility to already existing systems, and possibility to use with evolving BPM processes are mentioned in her study. This new range of possible implementations is created by lower financial costs and needs for change management; hence it can be used also for the non-core activities in different departments such as accounting, HR reporting and administration. Shome has made these observations in the telecom industry, making them relevant to bring in this study as the selected interviewees and the author are working in Telco.

Robotic process automation solutions can be augmented with AI tools such as machine learning, natural language processing, and computer vision. With the help of these tools, RPA can work more autonomously and with higher performance as it has the flexibility to interpret different interfaces, or changes in text fields or menus. As RPA solutions can detect objects in real-time and categorise them, they can also make dynamic actions with accuracy (Martins;Sá;Morgado;& Cunha, 2020).

2.1.3 Reasoning for RPA Implementation

The optimal use cases for RPA can depend on the organisations structure, the complexity and frequency of their business processes, and the level of maturity of their BPA processes. RPA use cases may emerge in different industries, such as banking, audit, insurance, health care, retail, and manufacturing (Devarajan, 2018). The business processes may vary in these industries, but they all have common chance to benefit for process automation. In this following chapter the reasoning for RPA implementation is going to presented according to the previous academic literature and case studies to define the optimal use cases and situations where other solutions could be more beneficial. Also, the governance options are presented to establish the best development environment for the RPA implementation in this chapter.

RPA is not suitable for all business processes, and as (Siderska, 2020) claims that the most beneficial cases to use RPA solutions are when there are high frequency and high complexity in the business process, while too complex tasks are not suitable. Those that have low complexity or high frequency should be handled by traditional business process automations. Similar type of categorising is also used by (Penttinen & al, 2018) to determine whether use RPA or BPA. Penttinen et al. also list other factors which can affect in favour of lightweight IT such as time

critical approach to market, low IT resource allocation, multiple systems under the scope of automation, and stable situation of user interfaces. They also highlight the aspect of the needed knowledge regime for lightweight IT is more socio-technical, driven by user's need for competent solutions that can be realised with innovation processes and consumerisation of the digital technologies. Heavyweight IT solutions need more technical knowledge regime, such as software engineering, which often means more costly work force and slower development time.

The ease of RPA implementation has also made it possible for companies to bring outsourced processes back in-house as the costs and risks decrease to a more favourable level with RPA and automation (Burgess, 2018). Returning outsourced processes is partly made possible by creation of high-paid jobs controlling the RPA solutions while eliminating low-paid job positions (Anagnoste, 2017). Insourcing these processes increases their governance, process handling and compliance (Hartman, Ogden, & Hazen, 2017). Increasing the level of governance will also shorten the time needed for the changes, hence helping to streamline the whole process.

In addition, if the process has a high possibility for human error but limited exceptions, it is a good candidate for RPA. (da Silva Costa & al., 2022) add that business processes to be automated should include the following characteristics: complexity, frequent, and accessing multiple systems. In addition, their research raises concerns about the data type and process maturity to be included in the characteristics when choosing processes for RPA. The data type should be rule-based and not involve any cognitive process before entering it to the system, and business process maturity is important as RPA acts on top of the legacy systems, mimicking human actions in audited business processes. Hence, RPA cannot be put in action when creating new business processes, it is rather for streamlining the current processes. Legacy systems in overall give a good reason to use RPA instead of creating adaptive new software systems. By legacy systems author means an older software or hardware that is still in use, even its technology cannot interact with newer systems (talend, 2023). Fulfilling these integration gaps from legacy systems to newer IT systems can be handled with RPA, as they can reach for info from complicated old systems and reform them as more comprehensible way and lets employees to fill in the information with ease and then RPA types it into legacy systems. This reduces the need of often costly and difficult software

reengineering or gives time to create an effective heavyweight IT solution in a fast-changing business environment while still maintaining the edge in the competition (Doguc, 2020).

Business process selection is a critical part of the RPA implementation process, and in addition to technical details mentioned, also the business side should be considered when choosing processes and especially when prioritising them. Business considerations include direct effects, such as time and costs savings that can be measured with FTEs, full time equivalents, or directly as financial costs when RPA can be set to do close-to-autonomous work, but they also include indirect effects, such as human labour processing more creative work leading namely to better customer service quality when they are not working anymore on those repetitive and mundane tasks that have been automated. These direct and indirect benefits will be discussed later in the theoretical background.

(Jalonen, 2017) presents a model in her master's thesis aiming to clarify the business considerations and the evaluation process needed before engaging into the actual technological development of the RPA solution. The evaluation process involves meetings with the subject matter experts, like customer services workers, whose work RPA is intended to assist or substitute, IT specialists to give more detailed insights from the systems the current business process is using, and business analysts to calculate possible savings in costs, time or increased customer satisfaction. These meetings are held to analyse the potential processes that could be automated with RPA solutions. Meetings start from setting targets and inspecting the possibilities around the business processes, to more in-depth analysis to see what savings could be created by the solution. Then analysts forward possible processes to IT and development teams which calculate an estimation for the deployment of the solution into present software systems. In the end, a meeting for reviewing the results and planning of the next steps should be held according to the model used by Jalonen. Similar types of Lean project management are mentioned in other studies regarding the possible business process to be automated (Holmberg & Härning-Nilsson, 2020).

One of these lean project management tools is (Orynbayeva, 2019)'s master thesis. He has created a governance model for managing RPA solutions from start to finish as an iterative cycle which includes elements from both IT and BPM governance aspects (Figure 1). His work insists that the RPA governance model and the implementation starts from incoming requests based on business needs, which are then refined to smaller streamline processes, which are then moved forward to

the implementation phase. For the implementation, he suggests agile development methods which provide continuous improvement and review the selected refined process. This type of agile approach is also recommended by (Holmberg & Härning-Nilsson, 2020) in their research on comparing different governance models in the Robotic Process Automation in the banking sector. In his governance model, Orynbayeva includes compliance and infrastructure management to the implementation phase as it is producing the final product, the RPA solution, to streamline the wanted business process. After that the solution is subject to maintenance and operational excellence processes and, as the last phase, it is put under evaluation of whether it should be remodified or decommissioned. These two options again create business needs to be fulfilled and the cycle can recommence.

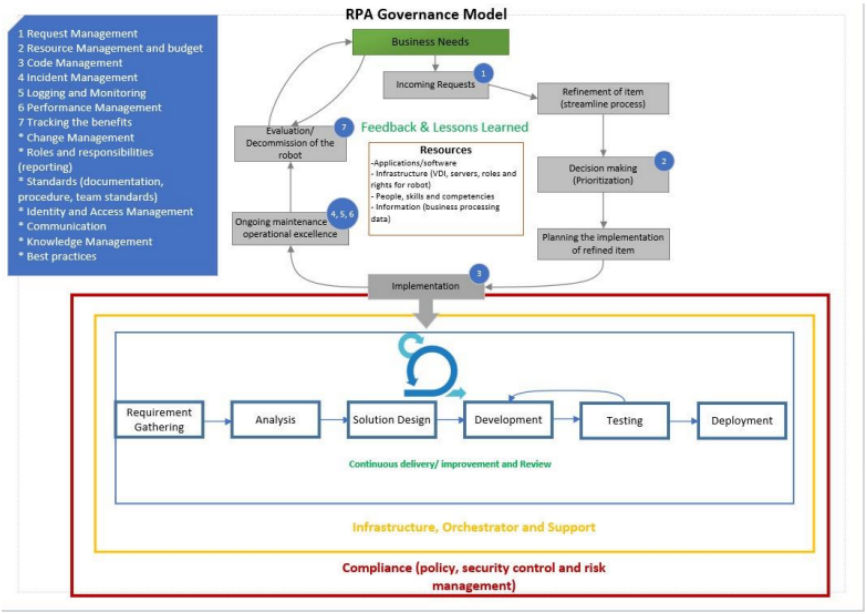

Figure 1 Orynbayeva's RPA Governance model

Another possible management opportunity is presented by (Holmberg & Härning-Nilsson, 2020) They mention that as RPA is such a lightweight solution, some firms have given its governance to individuals who can automate their own work, creating more specific small process automations. In this level it could be also defined as RDA, but as it was compiled under the definition of RPA in this research and in their study, the term RPA remains. Depending on the structure of the organisation, it can be a profitable approach so that people can conquer their own pain points with the RPA solutions, reducing their own work, and making them less stressed. Nonetheless, this type

of individual approach also has its negatives, as even the best practice solutions can be left to the use of a few individual persons as their existence is not obtained or known by the organisation's IT or business management. Hence, a study on these individually governed RPA (or RDA) solutions is suggested for future researchers.

2.1.3.1 Agile Methods for the Governance

RPA implementation and development are usually governed by agile project management methods. One of the most popular methods is Scaled Agile Framework, SAFe, which offers continuous progress with its iterative development cycle like the above-mentioned Orynbayeva's governance model. It has proven benefits on developing technological tools and integrations in a constant dialogue among the developers, the end users, and the project management. This continuous dialogue is a key factor for ensuring that the wanted features, benefits, and risks are taken under consideration by all shareholders multiple times during the development and that they are up to date when the feature is launched. SAFe helps shareholders to consider the possible benefits and risks, and to create impactful metrics to measure these. Managing projects under SAFe's seven core competencies has a proven record of increasing productivity, the speed of time-to-market process, employee satisfaction and engagement, and improving the quality of the development (Leffingwell, 2021). SAFe offers increased business agility by using Lean, Agile, and DevOps methods.

2.2 Benefits of RPA

All the mentioned models from Jalonen, Orynbayeva and Holmberg & Härning-Nilsson have similarities regarding the business characteristics needed to build a functional RPA solution. They all mention precautious planning and analysis of the process and its possible benefits and suggest the implementation phase to be performed with the agile project management methods. The planning and analysis phase is important, because in this phase the possible business targets and goals are defined. Reaching them shows the organisational management that the produced RPA solutions are creating value for the company and return of their investment. Defining value capture with the RPA solutions is difficult, as they can produce direct and indirect benefits to the company.

One categorisation of possible benefits was presented in (IBM, 2023)'s definition of RPA. They listed RPA benefits to include less coding, rapid cost savings, higher customer satisfaction, improved employee morale, better accuracy and compliance, and existing systems remain in place.

Another wider categorisation was created by (Holmberg & Härning-Nilsson, 2020). In their research, they claim that the benefits can be measured by five constructs: performance expectancy, effort expectancy, social influence, organisational facilitating conditions, and environmental facilitating conditions. This five-construct theory explaining the adoption process of the RPA was created by (Holmberg & Härning-Nilsson, 2020). Their theory is based on The Unified Theory of Acceptance and Use of Technology, the UTAUT model created by (Venkatesh, 2003). While the first two constructs can be reported in a numerical form, the third construct, social influence, is more about the perceived value that individuals believe to gain from using the technology. In the case of RPA technology, this social influence is assumed to be high as the RPA solutions are often created with a bottom-up approach, which helps to create a bridge over the gap between IT and business as they work together to automate business processes on general user interfaces. Because RPA technology can cause fear of possible job loss, building these types of bridges over department borders is "important to make sure that the aspects of the innovation are transmitted and understood by important stakeholders and users in the organization to fully capture how value is created in the RPA implementation process." (Holmberg & Härning-Nilsson, 2020). In addition, it is important to make sure that the perceived benefits are accounted on both sides.

Benefits of the RPA characteristics can be seen differently in different positions. From the managerial perspective, the RPA solutions raise trust to the auditability as the solutions document each step that they produce (Raju & Koch, 2019). Of course, the same data can be achieved from the already known present software systems, but RPA has the capability to make it easier, as all the clicks of the mouse or the selections made by the workers cannot be captured in their work process in the legacy systems. This is due to the characteristics, that the legacy systems tend not to have API gates to access the precise data on how the users have moved there. RPA offers an answer as it only does what it is meant to. Better documentation can also help the managers in the business and IT departments to see the business processes from a new perspective, and hence, the business processes themselves can be streamlined and ameliorated in the RPA implementation

process. The documentation can also be used in the development of traditional business automation processes and to create new software systems. This documentation aspect also creates risks as the processes might be left out of the revision when general development process starts, as the RPA solution can be regarded as already solved issue. Hence, it may lead into leaving the steps out of scope of the development process.

RPA technology brings benefits to the developers as well, as it offers less technological approach to automation, and hence, deployment time can be reduced and changes to the automation process can be made in short periods (Anagnoste, 2017). Centralised internal knowledge repositories are often created for RPA solutions as in other technological developments, from where ready-made solutions can be retrieved in case of having to automate similar type of business processes, or to further develop different business processes to work together (Kokina & Blanchette, 2019). One possible example is to have chatbot providing customer pre-written answers from where customer can select and start an RPA process in the background without customer service worker's interaction. Hence adding up two business processes and creating value for the customer and human resource savings to the company as the presence of a customer service agent was not needed.

RPA technology also brings perceived benefits for the end users, which are the workers whose tasks RPA solutions are intending to process. This creates opportunities for the work force as they can focus solely on processes that need cognitive skills, sales skills, or more complex thinking, which often are more profitable for the organisations. Besides these opportunities, RPA can streamline the working of the workforce by leaving increasingly more tedious tasks to be handled by automation, making the division of tasks clearer for the worker as possible exceptions are processed by starting an automated process (Jalonen, 2017).

2.3 Risks of RPA

The risks in the RPA implementation process vary from tangible issues, such as processes failing due to various reasons, to intangible issues, such as loss of tacit knowledge and understanding of the original business processes, and fear of losing jobs because of automation taking over the mundane tasks in the organisation. The failing processes can involve a placement change in the inspected field in the user interface that RPA is reading when gathering data from other software.

Small errors or changes in the processes can easily be multiplied when the worker is a preconfigured RPA solution, that can make mistakes more quickly and with certainty. These types of mistakes can be easily backtracked when the mistake is noticed. Nonetheless, they might have a significant impact on the output of the solution, and the correction of them might outbalance the gained benefits as fixing the mistakes requires human interaction. This naturally takes time that was previously saved when the RPA solution was working as intended. Intangible issues can involve RPA hindering the real progress to streamline business processes as it disguises the automated steps within the solution, hence those steps are not reconsidered when thinking of the development of the whole business processes (Kirchmer, 2017). RPA gives an opportunity to react on this issue as it documents all steps, but it is under the responsibility of the management to remember to take the steps within the RPA solution under consideration when planning to develop the whole business process.

The customer service's fear of losing their jobs could also be placed under intangible issues and risks hindering the adoption of the RPA technology. The fear of job loss is insisted to be one of the major elements slowing down the change management process (Berg, Buffie, & Zanna, 2018). This fear is justified by the fact mentioned in their study they suggest that 45-57% of low paid jobs in the US will be replaced by intelligent automation solutions. They did not mention any estimation on how many new jobs will be created to support this development of emerging technologies. This fear of job loss is also backed by PwC's analysis that AI, automation, and other emerging technologies will reduce the need of human workforce throughout the industries, mainly affection the low-education positions during the 2020's (Hawksworth, Berriman, & Goel). The customer service workers can resist the adoption of the new technology due to this fear of automation taking their roles in the organisation. As the adoption level of the new technology is low, the calculated savings from its usage also remain low, and therefore the adoption process should be handled with care.

BluePrism, one of the leading companies providing RPA technology and the one which has named the RPA, has been subject to many surveys and reports about their product and its benefits and risks. These results also provide the statistics about RPA in general as they have 13.5% market share of all RPA solutions providers (Enlyft, 2023). One report from Knowledge Capital Partners,

KCP (Hindle, Lacity, Willcocks, & Khan, 2017) depicts risks on eight different categories trying to understand the reason why 30-50% of the initial RPA projects are failing or not producing the wanted value for the organisations. Their risk categories include the following: RPA strategy, RPA sourcing, tool selection, stakeholder buy-in, launch/project, operational/execution, change management, and maturity risks. From these, the first three categories have a presentation of risks that should be handled before starting the whole RPA implementation process, hence lacking the relevant risks to this study that aims to categorise risks within the ongoing implementation. Preplanning mentioned above in the benefits section is within the implementation process as there the strategy, sourcing and tools have been already selected. Only the business processes that are prioritised and selected in the preplanning phase, will be analysed for RPA streamlining options. Five risks categories remain to be discussed for better understanding of them, how they are perceived and how they could be measured in the implementation. This will be discussed within the risk mitigation chapter.

Risks can also emerge from the perspective of value capture, in a form of value destruction, so instead of the RPA implementation bringing value it might even have more costs than it is bringing revenues. This value destruction perspective is well depicted in (Canhoto & Clear, 2020)'s research, where they discuss AI and machine learning as business tools and how the tools have value destruction potential. The risk of destructing value or not gaining any value has various causes when implementing new emerging technologies. These causes can be resolved in different phases of the adoption of new technologies. Canhoto and Clear mentions issues such as deploying new technologies into production too soon. This can be caused either by the users' lack of IT assets or making product launch without proper user acceptance testing, which would validate that the produced tool is ready to replace human on the specific tasks and all its possible variations. To remedy these, they emphasise the importance of embracing the change management and adapting the organisation's behaviour accordingly. The findings of their research can be seen in the RPA context as deploying something unfinished has to be either informed properly or made in discreet so that the end users have the impression of using a ready-made solution that completes the business process from end to end. This links to the transparency of the new automation solutions because inscrutability is often mentioned as one the main concerns when discussing the implementation of AI tools, and in this sense, the RPA shares the same characteristics. The new

automated solution can be unfamiliar and different for the end-user compared to the earlier manual work, so it can be difficult to trust the solution to make the business process correctly from end to end with all possible variations and exceptions, leading to the diminishing use and poor adoption of the new solution. Therefore, a presentation of the created automation and all steps within should be communicated to the end-users. For example, if there is an exception, that cannot be processed or resolved by RPA solution, it will be moved to the back-office workers of the project, who ensure that it will be handled by the guidelines of the original business process. This transparency of the created solutions could help the adoption, diminish the risk of value destruction, and increase the value creation through the RPA implementation.

Overall, (Canhoto & Clear, 2020)'s research implies that the adoption of the new technology is crucial to avoid the value destruction and ensure the value creation and capture. This finding directed this study to research and cover the literature about the adoption level and measuring of it.

2.3.1 RPA Risks with AI tools

When the RPA is augmented with AI tools, also their risks are to be aware of. The risks may consist of poorly decided NLP algorithm, illogically build software systems, or inconsistently named buttons within them. These can reduce or even block the use of AI tools. If the NLP algorithm is not trained properly, it may do mistakes on similar words, and lead the business process to be wrongly fulfilled. Inconsistently named buttons can cause NLP to fail, such as in two different applications the buttons with same writing proceed to different function, or if the context as whole is visible on the human interface but for the bot it is bordered to consist only the action buttons. Illogically build software systems can be problems for the computer vision, as it might be looking for differences between the logically nearest options, and not from the whole interface window. Hence, having a site or software system where the code is not logical with the visible user interface, can reduce the functionality of computer vision as it can use both sources to determine what is represented on the screen.

2.3.2 Risk Mitigation

The mitigation of risks is important in the RPA implementation process to ensure the fully captivation of its benefits and value to the organisation. The risk mitigation areas can be regarded

from the perspective of risk areas, for example PwC have categorised them followingly: executive, technical, change management, operational, and functional risks (PricewaterhouseCoopers, 2017). Similar categorisation has been made also by BluePrism report, which presented stakeholder, launch, operational, execution, change management risk categories (Hindle;Lacity;Willcocks;& Khan, 2017). BluePrism also listed risk categories to be considered before implication of the RPA, such as strategy, sourcing, and tool selection risks, which are also mentioned by (Roboyo, 2019). Both base their categorisation to (Lacity & Willcocks, 2017)'s book "Robotic process automation and risk mitigation: the definitive guide". Hence, the risk categories presented by PwC were chosen for the presentation of the risk mitigation methods.

The risk mitigation methods corresponding to these risk concerns were gathered from various sources (Kaur, 2023) & (Roboyo, 2019)). The methods are adoption, testing, design and architecture, documentation, and governance. They correspond to the risk categories followingly: executive risks – adoption, technical risks – testing, change management risks – governance, operational risks – documentation, and functional risks – design and architecture.

(PricewaterhouseCoopers, 2017) describe the executive risk category to ensure that all needed stakeholders are in with the process and agreeing on the development and its importance. The adoption level can be monitored to notify this risk on time, and analysis about the business processes and their automation should be regarded with all stakeholders to see possible technical obstacles and security issues.

Technical risk category was described to include elements towards the technical knowledge, and connectivity and scalability issues with legacy systems. Exhaustive testing in different implementation phases is crucial to guarantee that everything will be processed as planned, and implementation process will produce benefits for the organisation. Also, secure design for input validation, authentication, and authorisation reduces the possibility of technical risks.

Change management risk category included issues such as how the processes will be executed in case if RPA malfunctions, and how to manage communication to the workers to reduce the resistance of technology adoption. These risks can be mitigated by good governance of the whole process and by communicating the process thoroughly to the end users. In addition, step by step

adoption was recommended by (Kaur, 2023) as many RPA implementations fail because of too high volume of simultaneous change and exception handling processes.

Operational risks category included issues about how the performance can be controlled and how compliance will be executed with relevant regulatory requirements. These issues can be mitigated by the ameliorated documentation that RPA provides when executed correctly. Functional risk category included issues about standardisation of the processes, design control, and how implemented solutions can be tracked and audited. The risk for these issues can be reduced by design and architectural decisions.

As a conclusion, the above-mentioned risk mitigation tools are not comprehensive to the whole RPA deployment process in all organisations but can be used as guidelines when evaluating the perceived risks and their measurement metrics in the final benefits and risks measurement model.

2.4 UTAUT + AI Model

(Holmberg & Härning-Nilsson, 2020) mention Venkatesh´s UTAUT model in their research as one of the background models used in creating their own model to measure the adoption of RPA in the organisation. Venkatesh has since renewed his model to also include the characteristics to measure the AI tools adoption beside the previous perspective of measuring adoption of information technology in general. This new model involves the issues, the risks, and the benefits that can be confronted during the adoption of AI tools in the organisation. Even though RPA is not under the umbrella of AI technology by all the definitions, it exhibits similar characteristics in these regards. Hence, Venkatesh's renewed model is important to be familiar with when considering the risks of RPA implementation into organisation. This chapter explains the issues given by his model and gives implications on how these issues can be considered with the implementation of RPA solutions. With the author's experience in working in a telecom company's customer service and in RPA development, these issues can be considered from the RPA technology perspective, which then credits into using this UTAUT + AI model as a part of creating the benefits and risks measurement model aimed by this study.

The original UTAUT model aimed to create a single model depicting the previous innovation acceptance theories. The model is more focused on the behavioural aspects of the use of a new

technology, but specifically within the organisation not within the whole business environment consisting of consumer and supplier markets. (AcceptanceLab, n.a.)

2.4.1 Issues with AI Tools

Venkatesh mentions four concerns that are directly connected to the AI tools' characteristics: model is black boxed, model errors, model learning takes time, and model bias. These characteristics raise problems such as inscrutability, lack of trust on decisions and recommendations, loss of time, and biased results from the AI. Similar issues and concerns can be recorded when working with the RPA technology. RPA solution can be black boxed as it streamlines the actions made in the background, directly to the legacy systems. Certain actions during the process in the implementation phase can be performed by outsourced or back-office workers, hence it is not certain for the user if the actions are completed end to end by software robots or not. In some scenarios the steps of the RPA solution are not explained to the full extent, which also leaves the model black boxed for the users, or for the management. The RPA solutions can also make errors during their implementation if some steps have not been understood in the development, and even the malfunctions in the legacy systems can appear as mistakes made by RPA to the end user who is not using the given legacy system anymore. These issues can raise thoughts of uncertainty for the end user on the necessity of the RPA as there might be a human worker doing the process elsewhere or if the RPA makes mistakes that the end user could have avoided using legacy system directly by her- or himself. Therefore, the inscrutability of a black boxed RPA solution and the lack of trust caused by errors affect to the adoption of the RPA solution and diminish the perceived benefits and value gained from the implementation.

The latter two concerns cannot be placed in the RPA technology directly. Normally, RPA solution can be implemented and developed faster than a traditional automation or a machine learning model can be taught, so in this aspect RPA solution does not possess issues in the same sense than these more heavyweight options. And as the traditional RPA is a set of well-written steps, it does not meet the criteria of model bias as Venkatesh describes to be one of the issues with AI tools. If the RPA process has some AI augmentations such as computer vision or NLP, it can have issues with the model bias, but those are not considered to be critical as the main functions are processed with a set of non-arguable input and output values.

2.4.2 Issues with Employees

The concerns regarding human employees are the following: human biases and greater trust in human judgment, and algorithm aversion. These concerns raise the similar issues for RPA technology as towards AI tools. The work force tends to trust human actions more even if this entails statistically more mistakes and slower processes, as humans are prone to when confronting new technologies and ways of working. Even if the benefits are known and important, the methods for gaining them can be unused by the work force if they are too cautious toward the new technology (Mordini, 2007). Such fear and denial of using AI tools or RPA solutions can be caused by the previous experiences with the risks, or by not knowing what is happening behind the process. Hence, the work force may decide it is safer to proceed and execute the business process without the technological tool to maintain transparency and trust in the execution of every step in the business process. When human biases toward technology adoption continue rising, the ultimatum is a total algorithm aversion, which means using no technology at all. These concerns and issues regarding human employees decrease the adoption level of technology and perceived benefits as people judge the tools with radical statements concerning the smallest errors, or they are not ready to use the helping tool for fear of technology not executing the business process as intended.

2.4.3 Issues with Operational Management

Venkatesh mentions concerns towards the operational management, OM, as his last addition to the original UTAUT model. These concerns with the OM include broader issues than the previous more practical issues, but they have similarities and connection points with the RPA technology as well. The four issues with the OM are more stakeholders, incomplete and/or missing data, unknown or incorrect assumptions, and changing landscape (Venkatesh, 2021). All these issues are compatible with the RPA implementation as well. The implementation raises the number of stakeholders as previously the business processes were handled within the customer service, with the RPA implementation the IT and development departments are more included in the process. Caused by this wider structure within the company, the data can be incomplete and can affect to the assumptions in the development funnel, hence lead to wrong decisions in the RPA development

or for example in design. These three issues together cause the landscape to be constantly changing so the operational management must be sure that the wanted solutions are created as they have been designed for the users to ensure the best possible adoption of the RPA to the work force. Hence, a lean and agile project management and governance is needed to avoid risks caused by these issues with the operational management.

2.4.4 Factors to Adoption

The above-mentioned issues added to the original four predictors of intention to use and technology use augment the UTAUT model to be fit with the modern technologies such as the AI tools and RPA solutions. The predictors are performance expectancy, effort expectancy, social influence, and facilitating conditions. These predictors with the augmented issues will be used later for creating the measurement tools in different managerial levels and to raise discussion about the risks they include within them.

As the proper adoption of a new technology is important for the value creation and capture, this Venkatesh´s augmented UTAUT model offers a good set of measurements and perspectives to be used in the benefits and risks measuring model. The concerns towards AI tools are used as the risk factors and elements in the creation of the target model of this research.

In addition, the managerial perspective and concerns are brought up and asked in the email interview phase of this study and are then implemented into the model created in the theoretical part of the research.

2.5 Benefits and Evaluation Model

To create more background for the theoretical benefits and risks measurement model in different managerial levels, one considerable model to follow is the benefits and evaluation model created by an exhaustive literature review by (Meironke & Kuehnel, 2022). Within their literature review they have gathered and counted different perceived benefits and evaluation methods in RPA literature, concluding these findings into nine different benefit dimensions and metrics divided accordingly to these dimensions (Figure 2). Not all nine dimensions are embedded into this study, but the most frequently cited dimensions have been selected (Table 1). The four most frequently cited dimensions are efficiency, costs, compliance, and quality. Two of the original dimensions,

scalability and implementation effort, are selected as they present usable methods and perspective for the perceived benefits on the selected developer level position on the benefits and risks measurement model. Lastly, the employee satisfaction dimension is selected as it has proven to be a valuable dimension when measuring the perceived benefit and value in the organisation as (Ransbotham, Kiron, Candelon, Khodabandeh, & Chu, 2022) mention that the organisational value comes from the perceived individual value.

Efficiency (EF)	Availability (AV)	Scalability and Flexibility (SF)
• higher transaction volume • shorter throughput times • less delays and waiting times	• 24/7/365 availability • independence from business hours, employees‘ illness, vacations	• easy modification/ re-configuration • adaptability to different environments • various working modes (un-/attended) • easy up- and down-scaling • bot re-use
Costs (C)	**Quality (Q)**	**Compliance (CP)**
• higher ROI, shorter payback period • FTE savings • improved value creation • reduced compliance/quality costs • reduced costs for equipment	• fewer errors and higher accuracy • standardization and consistency of activities and data • improved anomaly detection	• increased documentation/transparency • improved auditability • additional control (e. g. four-eyes-principle) • consistency of activities and data
Employee and Customer Satisfaction (EX, CS)	**Interoperability (IO)**	**Implementation Effort (IE)**
• higher job satisfaction and interesting tasks • potential for process individualization • improved service quality	• easy system and data linkage	• easy to configure (no or few programming skills needed) • lower implementation complexity • less implementation time

Figure 2 Meironke & Kuehnel - Benefit dimensions and attributes (Meironke & Kuehnel, 2022)

From each dimensions the most important and cited metrics by the original literature review have been selected and presented in the Table 1. The criterion for the selection is based on their frequency in the conceded literature review and backed by author's own professional opinion when regarding the to-be interviewed company. Some metrics are mentioned with different weights in multiple dimensions and their possibly different meanings are discussed with the created model.

Some dimensions and metrics are affecting all the positions and the ones with lesser importance are depicted in the brackets. Bias between the perceived benefits will also be concerned, i.e., gained benefit in one position might not be beneficial in the other.

Table 1 Benefits from Meironke & Kuehnel model reformed according to positions.

Dimension	**Metrics**	**Position**
Efficiency	Average process or activity execution time Average number of agents Number of transactions	Manager
Costs	FTE savings ROI / Breakeven for investments Automation rate	Manager
Compliance	Error rate Increased standardisation	Manager (Customer service)
Quality	Availability / Bot downtime Error rate in data (Increased standardisation)	Manager
Scalability	Automation rate Average number of agents Number of bots per employees	Developer
Implementation effort	Development and rollout time Number of involved systems Increased standardisation	Developer (Customer service)
Employee satisfaction	User acceptance as perceived usefulness and perceived ease of use Complaint rate Time to solve exceptions	Customer service (Manager) (Developer)

Other models were researched and inspected during the evaluation of the theories in the literature review phase of the study. The following chapters present them and reasons why they were unfit for the purpose of this study. Main reason is that they are too generic, hence not creating viable measurement metrics to be followed.

One of them was transactions cost economy, TCE (Williamsson, 1981). Its different value terms have been summarised by (Minerbo & Brito, 2022) into five dimensions. These dimensions are helpful when creating an overall view over the value creation and capture in the organisation with all the perspectives, also relationships with the suppliers and buyers. Due to this broad view, this model was unfit to be used in this study even though its value terms under dimensions operational efficiency, asset efficiency and financial efficiency are broadly in line with the chosen model.

In their systematic literature review, (Minerbo & Brito, 2022) have created one overall framework for the value creation and capture, that gives a general point of view to the whole ecosystem of the value creation and capture. This framework was considered in the research phase but using it in the case study was not possible due to the limitations of the research. A value creating process from the framework was inspected. It simplified the process of the value creation and capture into steps ensuring the wanted results when executed followingly: requirement definition, customisation, deployment, post-deployment, and interacted value. This process was considered as an option rather than UTAUT, to set the benefits and metrics into a timeline according to the maturity and adoption level. The value creation and capture process depicts more general level of measurements and UTAUT augmented with AI concerns is more detailed into the subject and raising the importance of the technology adoption.

Other models and frameworks regarding the AI tools and their value creation were also inspected as the RPA has some definitions including it as one of the AI tools, or at least as one of the emerging technological innovations that can facilitate the progress towards AI solutions. As the RPA process can have AI tools such as NLP or computer vision used along with the original idea of automating business processes including data input and output, it is justified to consider AI value creation and capture methods to measure the RPA's benefits and risks. AI's worldwide market size and growing revenues implies its use to be growing more in the future and gaining possibilities to be adopted in almost every industry (Thormundsson, 2022).

Value creation and capture for AI business models framework presented in research created by (Åström, Reim, & Parida, 2022) was regarded as one option for the basis of the target model. It offers partly useful value capturing mechanisms, and identification of prerequisites for AI value creation. Their research focuses on how financial value can be captured by selling AI tools, but during the process it offers value and benefits also for the organisation where the tools are produced. These internal factors are the focus of this research towards creating the target model for benefits and risks management. (Åström, Reim, & Parida, 2022) refer to (Kaplan & Haenlein, 2019)'s model of the three levelled definitions for AI maturity, and the importance of acknowledging the vast field under AI definition when regarding possible ways of creating value through it. They present that AI could be considered as GPT, General Purpose Technology, that possess possibilities for improvement within all industries, and this GPT point of view is a good perspective for the use of RPA as well. This three levelled definitions model includes the above-mentioned ANI, that was used to create the definition of RPA for this research. In conclusion, their framework offers similar maturity or adoption timeline than the selected UTAUT model, but the framework was too general to be used in the RPA perspective. Nonetheless, it offered new perspectives and definitions to be used in this research about RPA processes as some similarities can be recorded between it and AI business models.

3 PERCEIVED BENEFITS AND RISKS MEASUREMENT MODEL

Main target of this research is to create a model to clarify the perceived benefits and risks of an RPA implementation on different managerial levels and which types of metrics should be followed to ensure that the wanted benefits are captured and the known risks are avoided in the adoption process. The created benefits and risks measurement model is author's implementation of the two known models, UTAUT + AI and benefits model presented above. The researched models were fortified with the other academic sources, and by author's own professional notes. The first version of the perceived benefits and risks model works as a hypothesis which is then evaluated by a qualitative email interviewing, intending to gain similar answers regarding possible perceived benefits or risks and metrics for their measurement. If the analysis of the survey shows that some mentionable benefits, risks, or metrics are missing, the model will be corrected in the discussion section of this thesis to have it more precisely presented in the conclusion.

UTAUT + AI model is to pinpoint the importance of the adoption of new technology and use of it, especially with the AI related concerns that were ratified to suit RPA environment. These concerns are suggested to be the risks in different managerial positions and placed accordingly in Table 2.

Table 2 UTAUT + AI model's concerns as risks for the different managerial positions

	Manager	**Developer**	**Customer Service**
Model errors	(X)	X	(X)
Black boxed model	(X)	X	(X)
Unknown/incorrect assumptions	X		X
Missing/incomplete data	X		
Changing landscape	X		
Human bias			X
Algorithm aversion			X

As the concerns are briefly presented in the research, this chapter aims to fortify their linkage to be concerned as the confronted risks during the adoption process. Categorising the risks under the concerns helps organisations and academics to reflect the level of maturity and adoption of the RPA technology. The reflection guides recognition on how these concerns might have been considered by the management already and what should be taken under consideration to establish the most valuable adoption of the new technology. If the risks are recognised and there are plans to act in the occasion of risk happening, it means that the organisation is on the right track of adopting the technology. The risk management should follow the process of identifying risk, assessing it, and taking steps to reduce it to an acceptable level (Stoneburner, Goguen, & Feringa, 2002). To enhance the adoption level, organisation should see what concerns and risks are possible to be recognised on the next phase of the adoption. This enhanced adoption level of the new technology promises greater value capture and ensures that the perceived benefits are captured in all positions.

The risks can be categorised under two dimensions, risk of not gaining all wanted benefits and risk of not being able to operate and handle the business process. The first links to value destruction idea presented above and the latter to operational management of the business. Hence, to (Stoneburner, Goguen, & Feringa, 2002)'s argument that "The principal goal of an organization's risk management process should be to protect the organization and its ability to perform their mission" should be added that risk management's goal is also to ensure that the organisation captures the full potential of the perceived benefits in the process of implementing new technologies into organisation. The latter risk concerning the operation of the actual business process is discussed in the following chapters, with mentions how different risks affect to benefit capture.

Concern about the model errors create risks in every presented position. Most importantly in the developers' position as they are the ones creating the RPA solutions to streamline the business processes, and hence, are responsible of ensuring that it is working intentionally. The model errors can raise risks also for the other positions, but these risks are more minor and can produce inconvenience about reporting and way of working. In the end, the risks categorised under the model errors should be managed by the developers of the solution. These risks affect on how the

end users, customer service, and operational management, adopt the new technology if they experience it to have faux pas every now and then, reducing the capture of perceived benefits in the process. On the other aspect, risks under this concern might reduce the functionality of the business process, and hence, increase the operational costs as the developers must work on the repairment and the automated process is not creating the value for the organisation during the repairment.

Black boxed model implies similar risks on the RPA solutions steps and their inscrutability. Its risks can be seen in every position in different forms. The main concerns are within the development as they are the ones that can affect the risks by making the changes to the automated process. The risks towards the project's operational management include the lack of knowledge what steps are within the already automated processes. Hence, these steps may become hidden in the eyes of the managers when they are modifying business processes or taking them for further development. Other stakeholders may also create risks in this aspect of black boxed model. For example, if the software provider makes drastic changes to the software's UI, RPA will stop working intendedly. This type of scenario can go unnoticed as the end users are not regularly using the software because of their input is automated by RPA solutions. It is also mentioned that AI augmentations can increase these types of risks, as change in UI can lead to RPA with computer vision and machine learning capabilities to learn new way to process the given tasks, as it has the credentials to make changes in the system. Hence, it is important to define suitable level of given credentials (Kokina & Blanchette, 2019). The inscrutability of the RPA solution may also influence algorithm aversion and human bias as the end users are not certain how the processes are handled within the solution.

Concern about the unknown/incorrect assumptions possess risks within the project management and customer service agents, as they together plan the processes and their goals. The risks include cases where not all information is transferred or registered during the planning meetings, ending the RPA solution to lack a crucial element, such as being able to cancel asked process from solution's work queue. The original business process can also have flaws, and as it is not optimised the RPA solution can only repeat the process as it is. This specific risk can be for example, if the original process includes searching customer data in different phases of the business process to

offer broadband availability for the customer's new address instead of using one set of input information to be processed in different search engines, so will the RPA process if it is created to work directly like the original process. For RPA solution to be efficient with it searches and data queries it should be set to skip unnecessary steps, or the original business process should be developed instead of using the same steps and process. The development of the original business process can produce additional costs and development time, so for the sole purpose of streamlining it, the fix should be considered within the RPA solution. The incorrect assumptions about the use of RPA might also create differentiation on the perceived benefits as the intended usage for project management and customer service can be different, for example, reporting of the specific incidents and handling the incidents.

Missing/incomplete data concern includes similar types of risks than the incorrect assumptions, such as the flaws in the design process if some crucial information is missing. In addition to those mentioned risks, missing or incomplete input data can affect to the legacy systems drastically. For example, RPA can run the process for name changes once a day, and if the customer service agent mistypes the input given to the robot it might lead changing the information in every legacy system. This again would lead into manual labour to fix the issues it may generate, reducing the benefits gained from the process. As a conclusion, RPA has the opportunity to reproduce the errors caused by the missing or incomplete in the same augmented pace that it can produce the correct processes.

As it was stated above the concern towards changing landscape is created by the concerns about the missing or incomplete data, unknown or incorrect assumptions, and having more stakeholders. These together include risk elements such as lack of communication and well-executed change management. As the adoption of a new technology is often done with agile project management tools, the procedures, rules, and goals can slightly change during the implementation process. This might produce risks in the mentioned concerns and tilt the implementation process towards uninvited directions and affect to the capture of benefits. Hence, the transparency of the project management and development is crucial to reduce the risks produced under these concerns. Transparent communication also reduces the risks of human bias and algorithm aversion as it raises the trust toward the new technology and ensure that the work force starts using it. Concern

including human bias and algorithm aversion creates risks such as a slow adoption of the technology or not using it at all, which then leads to the situation where all benefits are not realised.

Finally, these risk types are presented in the final theoretical model in Table 3 as they were titled by the original augmented UTAUT model. The measurement of these risks can be assessed by looking through the organisational structure and revising the processes that could possess any of these risks.

3.1 Theoretical Draft of the Model

Table 1 placed the benefits and possible metrics into the managerial positions, and they are used as hypothetical benefits in the RPA implementation process. Table 2 included the risk categories place according to the managerial positions. In the final model, Table 3, these benefits are combined with the risks and are placed in to correct positions with the metrics. The perceived benefits of the RPA implementation are regarded under seven dimensions and under three managerial positions to gain knowledge how the adoption could be improved by focusing on these benefit factors and elements. The wide category of different benefits is more profoundly presented in the theoretical background, but these selected dimensions comprise most of the known benefits about the implementation that are regarded in this study. The expected risks of the RPA implementation include seven concerns that should be regarded in the organisation during the process.

The final hypothetical model created by the theoretical background process of this study is presented in the Table 3. There benefits and risks are placed accordingly to the managerial positions by the knowledge gained in the previous literature and by the author's professional consideration. The reasoning for the placement is mentioned above in the benefits and risks chapter.

Table 3 The benefits and risks model for different working positions

	Project management	**Developer**	**Customer service agent**
Benefits *The possible metrics are listed under the benefit category*	Efficiency - Average process or activity time - Average number of agents - Number of transactions Costs - FTE savings - ROI / Breakeven for investments - Automation rate Quality - Error rate / Downtime - Increased standardisation Compliance - Error rate - Increased standardisation	Scalability - Automation rate - Average number of bots - Number of bots per employee Implementation effort - Development / Rollout time - Number of involved systems - Increased standardisation	Compliance - Error rate - Increased standardisation Implementation effort - Increased standardization Efficiency - Average process or activity time - Average number of agents - Number of transactions Employee satisfaction - User acceptance as perceived usefulness and perceived ease of use - Complaint rate - Time to solve exceptions
Risks	Unknown/incorrect assumptions Missing/incomplete information Changing landscape	Model errors Black boxed model	Human bias Algorithm aversion Unknown/incorrect assumptions

The metrics are according to the Meironke & Kuehnel's benefits model and are selected by a similar process than the benefits dimensions. Meironke & Kuehnel had gathered wide selection of different metrics within their research, but for staying within the limitation of this research, only ones with the most citations were picked for this research. Some of the metrics can play a role in measurement of different benefits dimensions. For example, increased standardisation can show the progress of the adoption in different benefit dimensions, but also in different managerial positions. Having more standardised processes can mean that most of the development processes start with the same objects, those can be easier to manage from managerial perspective as processes have similar objects in them, or from customer service agent's point of view, there is less differentiation when filling up the forms and making changes into software systems.

For the risk mitigation the risk concerns must be revised as mentioned and to ensure that organisation have plan to act upon them. Possible metrics for them are aimed to be gained through the analysis of the survey and then place in the model.

Many organisations have already the similar types of metrics in use to evaluate the progress of development, adoption, and efficiency. Hence, this model offers a more concentrated point of view what should be taken into consideration when implementing RPA into the organisation's business processes. Considering the above-mentioned benefit dimensions and risk concerns should lead the implementation management to gain the full potential of the adoption of the new technology.

In conclusion, this theoretical model consists of notable elements from the theoretical background chapters. The theoretical model and its elements will be compared with the analysis of the survey results and then ameliorated in the discussion chapter.

4 METHODOLOGY

In this thesis both methods of data collecting are used, both primary and secondary data. Main part explaining the major definitions and their linkage between one to another are based on exhaustive research on secondary data in form of academical journals and books, as well articles from private parties, such like IT companies using and vending RPA solutions, to gain and concise a comprehensive background for the reader to understand the various definitions of RPA and its possible implications into business world, especially in customer service segment. An extensive literature review method was used to gain enough knowledge to create the benefits and risks measurement model by comparing different methods and existing models. After this literature review and academic research and evaluation, deductive approach was used to create the theoretical model based on the previous literature.

Instead of using deductive approach, DSRM, Design Science Research Methodology, was inspected as a possible methodology for conducting a study that aims on creating a new model. DSR process' goal is to extend organisational capabilities by designing new artefacts to represent newly created theories, models, constructs, and methods (vom Brocke, Hevner, & Maedche, 2020). The most widely referenced process model by (Peffers, Tuunanen, Rothenberger, & Chatterjee, 2014) includes six steps: problem identification and motivation, definition of the objectives for a solution, design and development, demonstration, evaluation, and communication. In the model the process can be started from four different entry points: problem-centred initiation, objective-centred solution, design and development-centred initiation, or client/context initiation. This research was firstly designed by following this process model, but as the evaluation step involves measuring the present artifact being compared to the created design model, the DSR process was not suitable for the needs of this study because author did not have access to an alternative present RPA implementation model. Hence, aim of this study is to create a new model based on the theoretical background and previous academic research to help practitioners to measure perceived benefits and risks, without having an ongoing practical model to do so. There could not be an evaluation between the new and the former practice and author decided to follow deductive approach, which aims to create a model from the theoretical background and then confirming the hypothesis depicted as the theoretical model by interviewing professionals in the area.

The deductive approach is good when there is abundance of academic research on the given subject, a short time to complete the study and to avoid risk (Business Research Methodology, 2023). The vast amount of research published on the RPA created a good background for this approach.

To gain new data about the different perceived benefits and risks of RPA implementation and to confirm or reject the created model, a survey was held. The survey aimed to gain more knowledge about how employees in different managerial positions experience the process of integrating RPA into action and which benefits and risks they perceive to gain within their position but also what they expect others to gain from an RPA implementation.

As the survey with open ended answers is a qualitative method and cannot be held in that extent that it would offer only right answers, it rather offers guidelines that reader can use when evaluating the usage of RPA and that would ratify the model to the given industry when planning the implementation of it to present IT infrastructure. The chosen method of open-ended survey questions was selected as it let respondents to express their own thoughts while still grading the main features to be analysed between the different positions and managerial levels. The survey was presented with a short introduction into general aspects of RPA without telling the research questions to the interviewees to avoid any further bias on their answers as the number of interviewees was limited and therefore biased already by one company's IT and RPA policy.

4.1 Research Biases

Research biases can be categorised in different ways depending on the source or by the type of the research, and they can happen in every phase of the research. For example, data collection, data analysis, interpretation, or publication phase of the research have their own possible impact points to have bias reducing the accuracy of the research (Scribbr, 2023). Hence, in the next chapters the possible biases are discussed to raise validation and reliability of this research, and to avoid misinterpretation of data, findings, and opinions it consists of.

Addressing biases and expectations is important part in qualitative research to see outside of the author's interpretation, to form a ground for the academic basis, and to give ideas for further research possibilities (Wonjin, Huang, & Hill, 2012). This research contains some bias regarding the exhaustiveness and scope of the study. Firstly, the interviewed group of experts on the RPA

development area were from the same company that the author is working. In the company the idea and the vision of the RPA and RDA might have been mixed, which then influences the overall point of view or perspective about the researched subject. Some answers were containing more overall benefits of working in the specific position of the development and/or the implementation. That can be a cause of an observer bias, where observer might be seeing the benefits solely from one point of view, or an interviewer bias, as the asked interview questions were left open ended by the author. The responses have variation of used words, and interpretation of them was on the author's responsibility to ensure that their vision was understood correctly, and then place to the right category of benefits and risks measurement model. The conducted survey suffered slightly from nonresponse error, as not all the interviewees answered the survey, resulting that a new target group could not been formed under the time limitations. Due to the time limitations on the author's and interviewees' side not all answers could have been elaborated with focused interviews in time to meet the graduation goal. The bias concerning the scope of the study was reduced by using census approach, that is thoroughly introduced in the next chapter about the survey and its analysis.

In conclusion, the research biases were acted on the sample group and analysis phases of the survey with the best possible ways on hand. Other biases are discussed in the survey design and analysis chapter. The other limitations of the research and possible future research opportunities will be discussed on the discussion chapter.

5 INTERVIEWS AND ANALYSIS

An open ended email survey was held in a telecom company that has used RPA solutions since it has started emerging in the technology industry 2016, and interviewees were selected from different managerial levels and departments to gather a sufficient amount of different point of views about process functionality, perceived benefits, and perceived risks and fears to generate analysis and first-hand opinions about the perceived value and how it should be measured when implementing RPA technology into customer service of a telecom company. Interviewees' work titles are presented anonymously with the answers. The interviewees are from different managerial levels accordingly, project manager/product owner, developer, and customer service agent.

The sample group for the survey was selected within the telecom company where author works and is narrowed down by census approach to consist only the experts and professionals working closely with RPA processes. This approach led to sample size of 25 people, because even the telecom company have nearly 4000 people working in Finland, there are only approximately 400 people working within the customer service processes that are affected by RPA usage. From these 400 people only the ones working with the RPA development processes were selected as they have intuitive and expert-based knowledge. The selected sample group was expected to be able to provide answers to the survey at professional level over the three positions. This group of experts on the area were selected from the author's networks within the company by careful thought process who would have enough knowledge about the subject. The members of the sample group were first individually contacted by the author and asked to join the interview and give their perspectives and opinions about the benefits and risks within the RPA implementation. This approach causes a selection bias as the author was able to choose all the participants, hence the survey was also mentioned on general forum of the RPA development, to gather more unbiased information on the subject. In the end, 8 persons accepted to volunteer in this survey leading to a response rate of 32%, which depicts well the studied area within the company, but cannot be used to depict wider consensus in the industry. (Cantwell, 2008)

The survey was created with a neutral introduction to the area of the study. Introduction consisted of description of RPA process flow to ensure that all participants have understood it similarly and some examples about the possible perceived benefits and risks in different managerial levels. The

survey questions were formed around the research problem, without stating the direct research questions of the thesis to the interviewees to avoid response bias of socially desirable responses (Scribbr, 2023).

The first question for the interviewees was asking how they perceive the gained benefits of RPA in different managerial levels, including their own and two others. At the start of forming the questions, it was contemplated to ask only the benefits on their own job position, but it was assumed to generate only "automated" answers without further thinking of the subject. Hence, the question was structured to be in three parts, accordingly to the positions of the interviewees, to force them to think outside of the box, and possibly generate some new ideas of the perceived benefits on the other positions. The same reasoning was used on the second question regarding about the perceived risks on the RPA implementation to gather more data and perspectives on the research area, and especially on the regard of perceiving. This structure of acquiring knowledge from the different point of views, gives room for the respondents to elevate and elaborate their customed way of perceiving the subject area. It may also affect on their perception of the subject in the future as they might have better understanding on the general process of RPA implementation, and its benefits and risks after putting in some time to considerate the part of the other stakeholders.

The third question was intended to find different kinds of measurement tools and measures or KPIs for the benefits and risks the interviewee has answered on the previous two questions. Firstly, it was thought to be two separate questions, one for the tools and other for the KPIs, but as they tend to relate to each other the questions were formed into more comprehensive question.

In the original draft of the interviewee questions, that was sent to selected experts of the area, were a question that aimed to gain knowledge about the types of benefits were wanted from the RPA implementation on different managerial positions. It was later removed from the questionnaire as the draft answers were analysed and the answers were similar or same than with the first question regarding the perceived benefits. This may have been due to the small nuance difference of how people can see the ongoing perceived benefits on the different positions, and how they could see the value from the wanted benefits on the different positions. As a later notice, the removed

question could have been formed to consider only the interviewee's work position, hence leading to possible development innovations that could be gained from the RPA implementation process.

The order of these questions was intendedly created to help the thought process of the interviewee, and the attached introduction was ordered accordingly. The questionnaire with the introduction and removed question is found in Appendix 1. The interview answers are held by the author but were provided to the supervisor of this thesis during the evaluation.

5.1 Analysis of the Interview Answers

The following chapters consist of the analysis of the responses of the conducted survey. The results are for academic purposes as the gathered sample size is too narrow to draw guidelines in more general perspective. Nonetheless, the analysis and created final model aim to provide guidelines to practitioners and academics with a disclaim of the narrow sample size.

The analysis is made by coding the qualitative data into more comprehensible quantitative data by using thematic content analysis. The mix of two analysis methods was selected due to the nature of study. Thematic analysis is made for searching certain themes in the qualitative data by already known keywords and content analysis is used for sorting the amounts of open-ended qualitative survey responses into more convenient quantitative data that can be categorised with the insights gained from the literature review of this research (Medelyan, 2023). Coding of the survey responses was selected to provide notions that could fortify or confront with the theoretical model created in this research. The coding was produced with deductive approach as the researched model offers possible benefit dimensions, risk concerns, and measurement metrics to be either validated or denied by the answers of the industry professionals. Hence, the needed testing theory for the deductive approach was created already and the first two levels of hierarchical coding were created with the survey design. Deciding the first hierarchical level of themes was a straightforward process in this research, for them to be the three question categories, benefits, risks, and metrics. The managerial positions are regarded on the second hierarchical level, to precise the answers into right categories. These decisions were made prior to the creation of the survey so the questions with subsections are already coded on the higher level. The deductive approach was selected as it proves better focus on the researched subject compared to inductive approach which has advantages on studies where no previous theoretical frameworks are available. The deductive

approach is recommended to be used among the novice qualitative data researchers as it demands less academic craftmanship than inductive approach and is often less demanding timewise (Linneberg & Korsgaard, 2019).

5.2 Coding Process

The analytical coding process was done in Excel which provided enough tools for the rather manual processes with the given amount of survey responses. As the higher hierarchical levels into subject categories and managerial positions were already decided by the survey design the analysis was within sub questions that were divided by the given categories and managerial positions. The analysis process aimed to change relevant qualitative data into quantitative data that could be visually presented to fortify or argue with the hypothetical model.

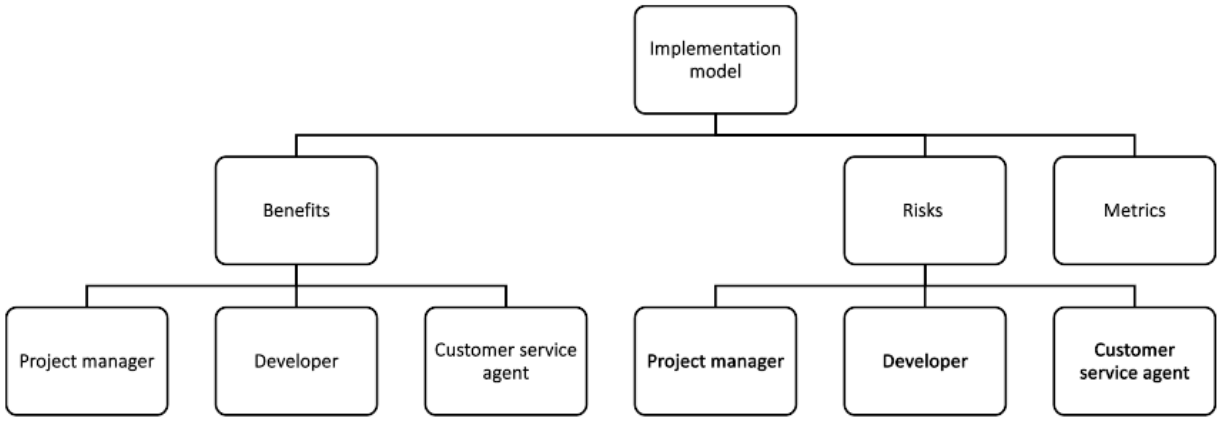

Figure 3 Hierarchical coding levels

Each subcategory will be analysed separately to bring insights about the different benefits dimensions, risks concerns, and metrics to measure them. For this, each category is firstly shortened to a form Qxx, where the first x displays the question category; Q1 for benefits, Q2 for risks and Q3 for metrics, and the second x displays the managerial positions; Q1a for benefits in project manager level, Q1b for benefits in developer level, etc. The text analysis brought some fortifying arguments to the benefits and risks, but also some new ideas and placement of dimensions and concerns within the managerial positions.

5.2.1 Perceived Benefits for Project Manager Position

Q1a was the subcategory for the perceived benefits that project manager position would gain through the RPA implementation. All the respondents answered this question. Seven out of seven original benefits dimensions were recognised from the answers. In addition to those, one new dimension was marked, resources. Three out of eight respondents raised resources as one of the main benefits gained from the implementation. Efficiency and costs dimensions gathered both seven mentions from the respondents, even though not everyone mentioned them, others mentioned them more than one time. The second most frequent mentions were towards the quality and compliance, which were coded under the same category because they were always mentioned in similar circumstances, and it was hard to distinguish them from each other. These two dimensions gathered agreements in total of five mentions. These four dimensions were estimated to be under the manager level when presuming the perceived benefits and as they were the most popular by the respondents the theoretical model was proved correct.

In addition to the assumed dimensions, the analysis gathered few mentions about the other dimensions as well. Two of the respondents mentioned the reduced implementation effort as a benefit for the manager, and scalability and employee satisfaction gathered one mention each. These results also speak for the right selection in the theoretical model.

The added resources dimension was explained to be slightly different from the time and costs savings, rather meaning that the automated business processes need less effort from the work force in general. This could mean a smaller group handling the same amount of work, which in the end represents in costs savings for the organisation. Alternatively, it could mean that managers need less resources to govern the processes as they can subjectively just see the results of the robots and adjust them, rather than leading a group of workers towards better results. The resources aspect was mentioned in the referenced benefits model by (Meironke & Kuehnel, 2022) under the implementation effort dimension, which was not considered to be under the project manager position in the theoretical model of this research. When the three mentions about the reduced resources are added to the previous two mentions about implementation effort, the value of this dimension raise. This finding clearly proves that the reduced implementation effort is also a benefit for the managers of the RPA projects and business processes. Hence, the theoretical model will be corrected accordingly to this remark.

5.2.2 Perceived Benefits for Developer Position

Q1b was the subcategory for the perceived benefits that developer position would gain through the RPA implementation. This question was answered by all except one respondent. Six out of seven benefit dimensions were recognised from the answers, leaving out the employee satisfaction. Two dimensions that were assigned to this level in the theoretical model, implementation effort and scalability, gathered the most mentions is this category. Implementation effort and scalability both had three mentions each, proving that those were correctly assumed by the literature and placed accordingly into the model. Efficiency dimension gathered two mentions, both explained to be created from the low code environment which RPA provides. Hence, the mentioned efficiency benefits are by-products of the easier implementation caused by more quickly coding process and can be placed under the implementation effort dimension, raising it to be the most mentioned benefit dimension.

In addition, costs, quality, and compliance dimensions gained one mention each. Reduced costs was seen as a benefit as RPA can be used by non-technical worker which are normally less costly to the organisation, or by the fact that the owner or user of business process can automate it without the help of IT worker. Quality was explained to be increased because of having fewer errors in the inputs to the systems, and compliance aspect was expected to be ameliorated as the business processes would be more accurate.

5.2.3 Perceived Benefits for Customer Service Agent Position

Q1c was the subcategory for the perceived benefits that customer service agent position would gain through the RPA implementation. All the respondents answered to this question. All seven benefit dimensions were mentioned in the results, and one new dimension was found. Training of the work force was mentioned to be reduced by four respondents due to the more automated options that RPA can bring to the business processes. The highest rate of mentions was gathered in employee satisfaction dimensions with eight mentions in total. Many of the respondents backed their reasoning for the better satisfaction of the worker caused by the other benefits that RPA offers. In these mentions also the customer satisfaction was counted as it is created by the front-line work force. The second most important dimension was efficiency with seven mentions. Efficiency on the back-office tasks frees time for the work force to be with the customer and reduces the average handling time, AHT, per customer. These two dimensions were presumed to

be the most important ones under the customer service agent level, and this was proved by the survey results.

The quality dimension gained four mentions where RPA was said to reduce errors on handling of the business processes and to ameliorate the accuracy and consistency as business processes are handled by automation. These traits are similar to the compliance benefits, which was presumed in the theoretical model to be one of the perceived benefit dimensions for the customer service agent position. Hence of the survey results, the compliance dimension was replaced with the quality dimension in the concluding model. The costs dimension was mentioned two times, but both were more about the labour costs, hence not direct benefit for the customer service agent himself. Lastly, implementation effort and resources were both mentioned one time each, and as clarified on the analysis of the Q1a, they can be counted under the same category.

Reduced training time and correlated ease of onboarding to work were raised by many of the respondents, hence the reduced training or onboarding effort was introduced under the customer service agent's level in the benefits model. It distinguishes from the implementation effort because it concerns the onboarding and implementation into the work position in a more general manner, not only adopting the certain processes that have been automated with RPA, but as adoption of those can be easily achieved more time is left for learning the manual processes and other needed knowledge.

In overall, the benefits section of the theoretical model had rather accurate presumptions that were backed by the survey results. Nonetheless, each managerial position was introduced with certain new benefits dimensions to be noted in the concluding model.

5.2.4 Perceived Risks for Project Manager Position

The analysis for the Q2 questions about the perceived risks in the different managerial positions was created with the same analysis method than in the benefits section. The thematic content analysis was performed under the same hierarchical levels than in Q1. As the risk concerns were not predefined on the same level than the benefit dimensions, the answers of the Q2 questions were categorised by theme and content of frequently mentioned subjects and then their relevancy with the assumed concern of the theoretical model is presented. The analysis was tried to perform with the assumed concerns' titles, but they did not have perfect matches with the results of the survey.

Hence, the results were categorised into nine risk categories by their frequency in the survey responses. During the coding phase these categories were discovered: process errors, loss of knowledge, adoption, development time, costs, security, technology dependence, legacy systems, and fear of job loss.

5.2.5 Perceived Risks for Project Manager Position

Q2a was the subcategory for the perceived risks that the project manager level might encounter during the RPA implementation process. All respondents answered this question, and eight out of nine risk categories were recognised from the answers. The most frequently mentioned category was adoption of the technology, it varied from slow adoption time to the maturity level within six mentions. The second most frequent category was process errors with four mentions. Process errors were attached to the potential system failures that could happen at any time due to wide variation of exceptions and software systems. Prolonged development time, costs, and technology dependence gained all three mentions each. The development time was feared to be as long as it would be with traditional business process automation, which would diminish the benefits of fast implementation of RPA. The costs category included risks driven by the other risk categories, such as if the adoption is not completed on the wanted level, the whole process has been misuse of resources, or if the development process prolongs over the planned deadline. The technology dependence was considered as a risk because if the technology is not working, the whole business process is in danger to be stopped until it is fixed, and because of the knowledge within the business process is lost when the workers are relocated to new tasks when the automation has been created.

More minor risk concerns were towards loss of knowledge with two mentions and towards security and fear of job loss with one mention each in the project manager position. Concerns towards loss of knowledge was expressed to happen because more tasks and skills are transformed from the subject matter experts and knowledge workers under the automation, leaving the knowledge of manually handling the business processes only to a handful of workers. Security risks may arise due various reasons, such as concerns towards the safety of the process' data handling or access handling as software bots may have rights to make more changes that is needed for streamlining the business process. One respondent was concerned about the possible job loss for the manager position, with a comment "if RPA can be used to manage projects (assisted by AI)" which can be the case in situations where workers are able to automate processes on their own.

5.2.6 Perceived Risks for Developer Position

Q2b was the subcategory for the perceived risks that the developer position might encounter during the RPA implementation process. All except one respondent answered to this question. From the nine risk categories, five was mentioned by the respondents in this subcategory. The most frequently mentioned category was the legacy systems and interoperability with five mentions. These concerns included connectivity and integration of legacy systems with other systems while using RPA solutions in top of them and their user interface level. The legacy systems can have features that are not well known because their age and complexity. Hence, they might be really complicated to use, even the manually done business process can have many alternating options that need to be selected to make the changes, and the developers of the RPA solutions must take these options and steps into careful consideration. The second most frequently mentioned was the technology dependence category with four mentions. For the developer position these perceived risk concerns were about continuous learning and use of new innovations in the industry where new technologies and ways of working are constantly emerging. If the development department lacks these capabilities the automated processes are not able to capture the full potential benefits. The third category was errors with three mentions. Concerns towards potential process errors were caused by the RPA's ability to multiply the possible error rapidly and the complex environment of the modern and legacy systems producing errors.

More minor risk concerns were towards the fear of job loss and development time. Fear of job loss gained two mentions with the same main concern of automation taking the jobs of the developers if it continues evolving at the current pace. This concern was connected to the constant need of learning new skills on the field of automation technology. A minor mention towards the development time was presented in the regard of complex legacy systems as they might need fixes while being in production environment when new exceptions are found and therefore delaying the target time for the other projects.

5.2.7 Perceived Risks for Customer Service Agent Position

Q2c was the subcategory for the perceived risks that customer service agent position might encounter during the RPA implementation process. All except one respondent answered to this questions, and six out of nine risk categories gained mentions from the respondents. In this subcategory the most frequently mentioned risk category was adoption, with five mentions. For

the customer service agents, the concerns to the adoption risk included scepticism towards the software bots' functionality and towards the automated processes in general, such as the RPA solution does not help the worker as it was planned to help or creates new exceptions to be remembered. The second most frequently mentioned risk categories were technology dependence and fear of job loss, both gaining four mentions. The technology dependence risks were attached to the possible new ways of working, as automated business processes can have their own UI's or needs of knowledge about the emerging technologies to use them properly. The fear of job loss was explained by the inevitable fact that the automated solutions are planned to be substitutes for the manual labour in as many tasks and processes as possible. The third most frequently mentioned risk category was errors with three mentions. It contained concerns towards the reliability of the processes as well as lack of trust towards the development, that all exception factors are considered within the process. These concerns were also linked to the adoption category but were separated as they had key words about errors and failures of the automation, which affect to the adoption level as well.

More minor concerns were raised towards loss of knowledge and customer experience, both with two mentions. As stated in the other subcategories, the knowledge of the automated processes can be lost because of lack of using the manual procedures and it may affect that the exception handling is slower as workers are not that accustomed using the software systems after the processes have been automated. One respondent argued that in a worst-case scenario there might be nobody capable of doing changes into the systems. These situations have direct impact to the customer experience as customers' orders cannot be processed at all or are processed slower than they are used to. Lastly, there was one mention towards the security risk category. This mention concerned the EU GDPR and handling of customer data accordingly.

5.2.8 Measurement Metrics and Tools for Benefits and Risks

Q3 was the subcategory for the measurement metrics, key performance indicators and tools that can be used to evaluate the benefit dimensions and risk concerns. All respondents answered to this question. The results for benefit metrics were analysed and coded based on the presumed metrics of the benefits. For the risks concerns and their metrics thematic content coding was applied. The results will be represented with different hierarchical structure, dividing the coded mentions into categories on regard if they are for measurement metrics of benefit dimensions or risk concerns,

and to measurement tools in general. As the measurement tools can be used to measure metrics within both categories, the answers presenting them were categorised as one.

Three themes were discovered to recur under metrics for the benefit dimensions category. These were time, number of processes and satisfaction. All themes consisted of various keywords under these headings. Time metrics theme gathered six mentions, number of processes seven mentions and satisfaction theme five mentions.

Five key performance indicators were calculated within the time theme. These were average handling time AHT mentioned twice, full-time equivalent FTE, queue times, and in more general perspectives, efficiency and productivity. All these KPIs are linked to measuring time through different reporting tools that are reachable within the business processes and their management. The general answers about efficiency and productivity include various metrics to be regarded, and these will be discussed in more detail in the discussion chapter of this research.

AHT is a metric to measure average handling time between customer and customer service agent, that is expected to be shorter as the agent does not have to do the processes manually when they are automated. Shorter AHT is linked to the shorter queue times as the same amount of work force can handle more customers.

FTEs cumulate from the longer periods. For example, the manual work can be measured to be five minutes for a certain process, and the process is counted to happen 1200 times during the month, leading the organisation to save 100 hours of manual work switched to automated work, which is approximately 12,5 FTE per month when divided by standard eight hour working days (Indeed, 2023).

Number of the processes theme gained mentions about the percentage of business processes automated and their usage rate among the workers, also one general perspective about performance level was noted. These KPIs can be measured by the RPA software tools, for example how many times certain automated process have run on the software, and by the management's knowledge of general amount of business processes compared to the automated ones.

Third theme concerning about the satisfaction gained mentions regarding on both customer and customer service agent satisfaction. The satisfaction can be affected by the ameliorated quality and consistency of the services as automated processes have less errors and are working continuously.

For the risk concern metrics one theme was discovered, this theme included metrics regarding the success/error rate, error handling rate, and more general notions about accuracy and quality metrics. Total amount of mentions in this theme was ten. Success or error rate percentages were mentioned multiple times as the most important metrics for the risk measurement. Few mentions also included the error fixing time or the urgency of fixing them as soon as possible.

Q3 also included question about the possible measurement tools that could be used to observe the level of perceived benefits or risks. Total of four different tools were gathered from the coded survey responses. These tools are surveys, meetings, testing, and reporting tools based on performance analytics and calculations. Reporting tools gained seven mentions and was the most frequently mentioned tool category. It contains CRM reporting systems and project reporting systems, from where the managers can see the performance of the worker or of the RPA solution. This tool was commented to be the simplest and the most efficient to measure the numerical metrics such as number of processes or errors, and time related metrics. The second most frequently mentioned tool with four mentions was conducting surveys to the workers in different positions. This tool was mentioned to be efficient to satisfaction measurement. Meetings or interviews were mentioned three times as tools to ensure that the adoption level or the entire project will be on the right track. This was mentioned as an importance of “agile daily ceremonies” to keep all the stakeholders “in the loop”. As final tool testing gained two mentions with comments that it should be done to mitigate possible technological risks towards the connectivity issues and functionality of the automated processes.

These findings from the survey analysis have created a good background for the discussion chapter. While aiming to create the benefits and risks model with the best possible benefit dimensions and risk concerns with measurement metrics the theoretical model needs to be revised according to this analysis of the survey results.

6 DISCUSSION

The aim of this study was to research if the benefits and risks vary in the regard of different managerial positions during the RPA implementation. The main contribution of this study was the establishment of the benefits and risks measurement model placing the perceived benefit dimensions and risk concerns under the three managerial positions. Another important contribution is the thorough analysis of the survey results in which the selected professionals add their valuated opinions toward the aim of this study.

6.1 Benefits of RPA Implementation

In light of the newly possessed knowledge, the benefit dimensions were placed under the managerial positions. The results of the survey analysis guided author to revise the theoretical model in the regard of the perceived benefits in different positions and new dimensions were added to the positions according to the gained knowledge. In the benefit dimension side of the model, three additions were made, one under each managerial position.

Under the project manager position, implementation effort was added as one of the perceived benefits gained through RPA implementation. The implementation was suggested to reduce the needed resources from the managerial perspective when the RPA governance was in set level to be easily adopted in new project of streamlining business processes. After the added dimension, the project manager level is supposed to gain benefits within five benefit dimensions. The final dimensions were efficiency, costs, implementation effort, quality, and compliance ordered accordingly with the gained mentions. This finding demonstrates that the project manager position gains most benefits from the RPA implementation, which is in line with the general knowledge of businesses being improved with top-down perspective. These benefits relate directly to the organisation's performance and revenues.

The developer position was perceived to gain benefits under three dimensions, implementation effort, scalability, and currently added efficiency. Even though, the gained efficiency was implied to be a by-product from the reduced implementation effort, but it was raised to the model as there were significant amount of mentions about time savings due to the RPA implementation. In the concluding model, the perceived benefit dimensions regarding the developer position are directly benefits toward the workers in this position rather than general benefits for the organisation.

In the customer service agent position the perceived benefit dimensions were adjusted by the results of the survey. The implementation effort dimension was replaced with the new training time dimension which was more descriptive towards the gained benefits in this position. In addition, as it was stated in the analysis of the survey results, the compliance dimension was changed to be quality dimension to be more precise with the gained benefits. With these changes to the theoretical model, customer service agent position is perceived to gain benefits from RPA implementation in four benefit dimensions, employee satisfaction, efficiency, training time, and quality. These benefits directly concern the workers in the position as the latter three dimensions affect also to the employee satisfaction which is the most beneficial for the position itself. In addition, all dimensions have impact in the overall performance of the organisation and can add benefits and revenue rate on the organisational level.

6.2 Risks of RPA Implementation

As the risks were presented in the theoretical model as concerns towards the adoption level of implementation, and gained survey results were in more practical level, new approach was researched to categorise the results in more presentable manner. The BluePrism report by (Hindle;Lacity;Willcocks;& Khan, 2017) was introduced in the theoretical background as one of the considered risk categorising models. It was backed by similar findings by (PricewaterhouseCoopers, 2017) and (Kaur, 2023) in the risk mitigation chapter of this study. Their common understanding was to divide risks during the RPA implementation phase into five categories. As a reminder, these categories were stakeholder or executive risks, technical risks, operational risks, change management risks, and functional risks. In the next paragraphs the risk concerns from the theoretical model will be introduced to this framework, followed by an introduction of the survey results to this framework as well. In the theoretical model no operational risks were presented and as many of the respondents answered those to be considered the theoretical model needs dire revision.

The original risk concerns about more stakeholders and changing landscape are placed into stakeholder/executive risk category because of their relevancy to the risks in the higher managerial positions. The risk concerns towards model errors and black boxed model are placed into technical risk category, as they related to the technical capabilities needed to build RPA solution. Human bias and algorithm aversion risk concerns are directly related with the change management risks

and are placed in the according category. The risk concerns about missing or incomplete data, and unknown or incorrect assumptions are placed under functional risk category since they possess the risks about understanding of the original business processes. This fusion is represented in the Table 4.

Table 4 Risk concerns categorised into risk categories.

Risk categories:	**Risk concerns:**
Stakeholder / executive	Changing landscape
	More stakeholders
Technical risks	Model errors
	Black boxed model
Operational risks	
Change management risks	Human bias
	Algorithm aversion
Functional risks	Missing/incomplete data
	Unknown/incorrect assumptions

The analysis of the survey results represented risks categorised into nine more accurate risk categories, now stated as subcategories. These nine subcategories can be placed under the five main categories as follows: stakeholder or executive risks category contains costs and adoption subcategories from the analysis of survey results, technical risks category contains development time and legacy system subcategories, operational risks category contains security and customer experience subcategories, change management risks category contains loss of knowledge, technology dependence, adoption, and fear of job loss subcategories, and functional risks category contains errors subcategory. Due to its nature and analysis of survey results adoption subcategory is represented in two main categories. This placement is presented in the Table 5.

Table 5 Risk subcategories categorised into main risk categories.

Risk categories:	**Risk subcategories:**
Stakeholder / executive	Costs
	Adoption
Technical risks	Development time
	Legacy systems
Operational risks	Security
	Customer experience
Change management risks	Loss of knowledge

	Technology dependence
	Adoption
	Fear of job loss
Functional risks	Errors
	Unknown/incorrect assumptions

With the revised upper categorisation of the risks, these results of the survey can be placed under the managerial positions. Their final placement can be seen in the Table 6, where they have been set under the managerial positions according to the survey results.

6.3 Measurement Metrics and Tools

A set of remarks were gained from the analysis regarding the general efficiency and productivity metrics, and the number of processes metrics. As stated in the analysis section of the research, the number of processes metrics can be used to measure the automation rate by comparing the numbers of bots to total amount of the business processes. This would offer a certain percentage for the management to follow the adoption of the technology, especially if the number of used automated processes is added to the calculation. In the end, it is to be remembered that not all processes can be automated with the current technology that was claimed within the survey answers. Hence, the automation rate should be responsive to the current possibilities where the total number of possible business processes may rise with the emerging technologies while the number of automated processes keep rising simultaneously.

The question for the measurement metrics and tools could have been divided into two sub questions, one about the metrics, and another about the possible tools to measure the metrics. As these two subjects were asked under the same question, not every interviewee answered to both. Placing them together would have probably led to more precise answers to each category. This problem did not occur on the draft versions of the survey. Hence, it was not noted before publishing the actual version of it.

The analysis of the answers was concluded despite of flaw of combined question in the survey design, and the findings were placed in the final model. The thematic classification from the analysis was maintained for the final model as the measurement metrics and tools were not thoroughly classified in the theoretical model. The results of the analysis proved that some of the tools are more effective on measuring certain metrics but placing them accordingly on the table was not suitable to maintain the readability of the table. The metrics presented on the theoretical

model were discarded and the metrics coded in the analysis of the survey results were placed to the final model, as they were discovered to be more presentable in categorised themes than under the managerial positions.

6.4 The Concluding Model for Benefits and Risks Measurement in Managerial Positions

Table 6 presents the final model for benefits and risks measurement model by placing the perceived benefit dimensions and risk concerns under the managerial positions. The table also present the suitable metrics to be used for their measurement, and tools to measure these metrics for continuous evaluation of the implementation process. The theoretical model was successfully augmented to this final state by the analysis of the survey answers, where opinions from the industry experts were gained to ameliorate the assumed placements and categorisation.

Even though the UTAUT + AI model was removed in this discussion chapter it has its place in this research as it represents the similar concerns that the previously selected risks categories. The risk concerns and the chapter contemplating their status on RPA implementation shows well the similarities of AI and RPA within the mentioned concerns. The model of benefit dimensions created by Meironke and Kuehnel was proved exceptionally beneficial for creating the categorisation under the managerial positions and to gain perspective on potential metrics for benefit measurement.

Table 6 The final model for benefits and risks measurement in different managerial positions

	Project management	**Developer**	**Customer service agent**
Benefits	Efficiency Costs Implementation effort Quality Compliance	Scalability Implementation effort Efficiency	Quality Efficiency Employee satisfaction Training time

Risks	Stakeholder / executive Technical risks Operational risks Change management risks Functional risks	Technical risks Functional risks Operational risks	Operational risks Change management risks
Measurement metrics	Time: FTE, AHT, Queue times Number of processes: Number of exceptions, Utilisation rate, Automation rate Number of errors: Success/ error rate, Error handling rate/time Satisfaction: NPS, Customer experience, Worker experience		
Tools	Surveys Meetings Reporting tools Testing		

6.5 IT Paradox

When discussing the RPA implementation and its lightweight nature compared to the traditional heavyweight business automation, the nature of IT paradox is to be remembered when developing IT infrastructure. Even though the processes are made easier for the end users, it involves adding more steps to already used business processes and hence making it a more complex structure (Evans, 2012). This complexity possesses a risk as the knowledge within the inscrutable processes can disappear from the organisation's knowledge, increasing the risk of operating if something would happen to the reformed process. In addition, the complexity prolongs the process of finding and fixing the problems and discovering new possible development areas. This is mentioned as a concern in Venkatesh's UTAUT + AI study and discussed in the according chapter. As a conclusion, the benefits gained from adopting the emerging information technologies are simpler processes and the value derived from them, even if the whole infrastructure might enlarge into a more complex environment in the process.

6.6 Limitations and Future Research

In this chapter the limitations of research will be discussed, and future research opportunities raised accordingly. Main limitations for this research were related to the lack of time and size of sample group. As this research was done as a proof of academic competences of the author, it did not aim

to create omnipotent solutions or peer-reviewed model for the research problem, rather a one possible solution to the measurement of benefits and risks during the RPA implementation. The research could be rerun with larger target sample to gain more confidence on the researched benefits and risks, and their placement under the managerial positions. Also, the division could be done by industries to create more suitable models for different industries or into different maturity levels.

Another possible future research problem is risk mitigation during the RPA implementation. There are studies regarding the risks and their mitigation on organisational level, but no research was found to have more precise categorisation of the risk mitigation tools to different managerial levels. Also, the change management frameworks and their presentation or evaluation in the RPA implementation would be beneficial to gain best practices for different size and type of organisations. Self-governed RDA or RPA projects can also present future research possibilities as the emerging technologies offer tools for workers to adjust and develop their own workflows more easily.

7 CONCLUSION

The purpose of this thesis was to establish if benefits and risks of RPA implementation can be assessed under the managerial positions within the process to ease the measurement of them. The subject was approach by reviewing the present theoretical background with its current models and frameworks for benefits and risks categorisation. With the use of existing literature, a combined model was formed to act as a basis of the survey. The theoretical model was then reformed according with the knowledge gained from the survey.

The research problem was explored through three research questions. The research questions and answers are summarised as follows:

RQ1: What perceived benefits are seen on different managerial positions in RPA implementation?

The final model (Table 6) concludes the perceived benefits under different managerial positions. These can used as guidelines by practitioners or academics when planning the adoption of robotic process automation technology in their organisation or in future research. The quality and efficiency aspects are presented to be the most beneficial for all positions while all positions have their own distinguished benefit dimensions as well, which should be considered when evaluating the results of RPA implementation in different positions.

RQ2: What risks are seen on different managerial positions during the implementation?

The risks in the final model (Table 6) are placed under managerial positions by the regard of importance and occurrence rate to represent the most important risks to be concerned in different positions. In the project manager position all risks categories should be investigated and acted upon the implementation, while in the two other positions only specific categories raised concerns to be handled. With right actions to mitigate these risks on different positions the full potential of RPA implementation can be achieved.

RQ3: What metrics should be used to measure these benefits and risks in different positions?

The final model (Table 6) presents the measurement metrics and tools for evaluation of the RPA implementation in different managerial levels. Metrics were discovered from the existing literature and the survey answers. They are categorised under the themes created in the coding process of

the survey answers to be more accessible for practitioners and academics to proceed with the specific elements. The tools for measurement were completely gathered by the survey results, and they were recognised to be useful in measuring multiple metrics, even though differentiation between them was presented as recommendations in the analysis phase of this research.

As has been shown in this thesis, the perceived benefits and risks may vary in the different positions of the organisation, and they should be considered when planning the implementation of Robotic Process Automation into organisation's business process strategies. The level of automation continues rising in every industry and RPA has shown its capabilities to perform as a steppingstone towards more complex artificial intelligence solutions that will change the future of ways of working in many positions. Being aware of the emerging technologies and their possibilities has always been one of the key factors for business opportunities and improvements, and RPA makes no exception to this. Hence, considering different approaches for implementation and evaluation is crucial for the business owners and managers.

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Appendix 1

Value creation and capture in RPA implementation

RPA, Robotic Process Automation, is a software technology that is made to mimic human actions to save human workforce from repetitive manual digital tasks to prevent humane errors, to make these tasks faster, and to free human to more creative and innovative tasks. Streamlining workflows can create multiple benefits for the company, financial and non-financial.

The known direct benefits include mainly savings in time, human labour, and costs. Indirect benefits include more creative and productive time given to end users, and hence raise the feeling of valuation at the workplace. Benefits on the managerial level include increased auditability and improved documentation about the business processes as with the RPA solution everything happens in known steps. The documentation aspect helps also developers as the business processes are reconsidered to create most effective automation, which then helps constructing the traditional business process automation and the IT infrastructure in overall.

The known risks include behavioural issues as an organisational change resistance from the work force in the fear of losing their initial job tasks to RPA solutions. This issue is known to exist in various IT tool implementations and can be affected by good internal informing and "marketing" of the new tools. The risks also include technical issues such as if there are still knowhow and volume in the company's workforce to process the automated tasks well and fast enough to not have visible problems in the eyes of the customers in the case of the RPA solution has malfunctions.

This short question pattern is to raise the importance of the known benefits and risks, but also to raise awareness about the unknown or more seldomly mentioned benefits and risks when working on RPA implementation. Hence, the mentioned benefits and risks should be brought up if they are considered mentionable – even they are here in the introduction.

Questions for all interviewees:

1. What benefits (direct and indirect) are received from RPA in
    a. Project management perspective?
    b. Developer's perspective?
    c. Customer service perspective?
2. What risks or fears (direct and indirect) the use of RPA solutions raise in you in
    a. Project management perspective?
    b. Developer's perspective?
    c. Customer service perspective?

(What benefits are wanted from RPA in

    d. Project management perspective?
    e. Developer's perspective?
    f. Customer service perspective?)

3. What kinds of measuring tools and indicators (KPIs) are there in use to measure mentioned benefits/risks?