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Lightweight IT investments: Factors influencing Profitability

A study of how IT implementation influence profitability in Norwegian companies

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Acknowledgments

This thesis represents the final part of our major in Business Analysis and Performance Management at the Norwegian School of Economics. The topic of our thesis takes place in the intersection between technology implementation and business performance. Our thesis is based on digitalization and management in which we both share a common interest. The process of writing our thesis has been challenging and time-consuming but also educational.

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Enjoy reading!

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Abstract

Several projects are underperforming due to a lack of return from IT investments, resulting in low profitability. The thesis seeks to uncover whether the absence of value creation applies today and for investments in lightweight IT. It elaborates on different factors possibly improving profitability and challenges previous research. In addition, the thesis investigates whether benefit realization management (BRM) leads to better results within lightweight IT projects.

The theoretical framework provides insight into lightweight IT projects and BRM and derives equations for measuring profitability. Our focus is on how the profitability of the customers of the start-up company RPA Supervisor has developed due to the implementation of their software. The software automates monitoring, managing, and orchestrating a company's digital workforce, i.e., their robots. The customers' profitability is investigated by evaluating the technology's benefits and risks.

We performed a structured interview of the customers of RPA Supervisor to gain insight into viewpoints regarding their experience of the software and benefit realization. Furthermore, to answer our research question, the profitability development was investigated through a comparative analysis that addressed and analyzed factors that influence profitability. The results were examined in light of the development in profitability and the use of AI in Norwegian companies.

The analysis revealed that the implementation of the RPA Supervisor software leads to benefits such as improved supervision and performance of the digital workforce. In addition, we found that the most prominent risks were discrepancies in performance and general errors. The discussion exposed that the positive effects of the benefits were high and that the risks were low. Moreover, we discovered that using BRM is unnecessary to achieve more benefits. Finally, we proposed a greater focus on business value than financial parameters when implementing new IT software. Although our findings could not determine with certainty how large the change in profitability has been, we concluded that a marginal change in benefits leads to a development in profitability.

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1. Introduction

Robotic Process Automation (RPA) is increasingly implemented and used by businesses to improve operational efficiency, reduce costs, and keep up with technological evolution. However, research shows that most IT investments underperform largely because the focus lies on the implementation rather than the realization of expected benefits (Torres, 2021). In addition, although RPA does not require much programming knowledge, it can be challenging to handle and monitor. Hence, many businesses do not experience the full potential of their technology. Therefore, we find it interesting to explore whether such lightweight technology leads to a positive development in profitability. Furthermore, we want to investigate and discover whether the absence of realized benefits also applies to lightweight IT and discuss whether a more appropriate approach than BRM exists.

1.1 Research question

The thesis attempts to examine the following research question:

"How has the profitability of established companies developed due to implementing the RPA Supervisor?"

We examine the profitability in the form of realized benefits, and we assess the project by looking at business values as a measure. The Norwegian companies we analyze operate in various industries and are of different sizes. The RPA Supervisor software works as a digital automation manager that can simplify the orchestration of companies' digital workers, i.e., their robots. We also investigate whether benefit realization management is applicable when implementing lightweight IT.

1.2 Outline of the thesis

Our thesis starts with a literature review in chapter 2, which intends to obtain an overview of existing studies and research within benefit realization management related to IT projects and the lack of return. Chapter 3 presents our collaborative company, RPA Supervisor. Furthermore, in chapter 4, we provide the theoretical foundation for the thesis. This chapter includes a presentation of the relevant topics and the theoretical functions for measuring profitability. The methodology used in this thesis is described in chapter 5. Chapter 6 contributes statistics on profitability and AI technology in Norwegian companies. Furthermore, chapter 7 presents our empirical findings through descriptive statistics, while chapter 8 discusses the results through a comparative analysis to answer our research question. Finally, the conclusions of our study are presented in chapter 9.

1.3 Background and purpose

The motivation for this topic originates from our interest in business performance and digitalization. We find it highly relevant to study how companies create value through digitalization technologies such as the RPA Supervisor and how it affects their profitability. The technological development puts pressure on existing companies to adjust to the occurring changes and to perform adaptability and proactivity. Based on this, we find RPA an interesting topic as it potentially leads to significant benefits at a low cost. Thus, RPA can contribute to competitive advantages for companies in today's dynamic business environment and ensure long-term survival. Given that we are entering the fourth industrial revolution, existing companies must implement and attract knowledge about smart and connected technology (Schwab, 2016).

The RPA Supervisor software is a digital automation manager that can prioritize and handle events 24/7. Lightweight IT, especially RPA, has become one of the most important and fastest growing concepts in the rapidly changing global economy (Kedziora & Kiviranta, 2018). According to Gartner, the RPA software market grew 62.9% in 2019 and was the fastest-growing segment for the second consecutive year in the enterprise software market (Gartner, 2020). The RPA software performs repetitive and structured tasks faster and more accurately than humans. However, the problems connected to monitoring, orchestrating, managing, and interacting with the robots seem to be increasing (RPA Supervisor, 2021). These deficiencies which require supervision were the origin of the RPA Supervisor. This software solves the main problems regarding managing, monitoring, and orchestrating companies' digital workforces. Thus, this is a company of great interest as it provides an innovative solution to the market.

During the Covid-19 pandemic, we have witnessed how crucial innovative technology is, and RPA has increasingly been used to reduce costs in recent years (Gartner, 2020). Since more people have been ordered to work from home, digitalization has become more and more crucial regarding achieving competitive advantages. In this way, the pandemic has functioned as an accelerator for technological innovations.

Since RPA Supervisor is a newly established company that currently operates as a monopoly in the Norwegian software market, the benefits of implementing a digital supervisor are, to a large extent, still undiscovered. Therefore, this thesis examines the benefits and risks associated with the RPA Supervisor and how they affect profitability. Measuring profitability in non-financial terms has been proven to be more valuable when implementing lightweight IT as it provides a more holistic view of value creation (Cronk & Fitzgerald, 1999).

Nevertheless, this paper will investigate whether the previous literature regarding lack of value creation within IT still holds and whether benefit realization management is favorable when investing in lightweight IT. Our study will be valuable for companies that, in the upcoming years, will see themselves forced to re-adjust their business model to keep up with the technological development.

2. Literature review

New technological innovations such as RPA have significantly changed how organizations work and are a topic that is often discussed in the literature. Business leaders see opportunities for the transformative possibilities of automation, and existing literature claims that there are many associated benefits. Today, a growing focus is on value creation and achieving benefits from IT investments (Karlsen, 2008). Implementation of lightweight IT can lead to benefits such as cost reduction, productivity improvements, error reduction, and improved process speed (Aguirre & Rodriguez, 2017).

Although new technology may lead to value creation, previous studies signal a gap between the expected and realized benefits from IT projects. Ward et al.'s study from 1996 showed dissatisfaction towards value delivery from IT investments (Ward et al., 2007b). These results were again proven relevant as McAfee (2003) and Markus (2004, p. 5) found that 75% of all IT projects do not yield the expected benefits. Another study by Ward et al. (2007b) showed that even though there has been an increase in the adoption of structural approaches towards IT projects, there has not been an equivalent increase in the benefits realized. These studies illustrate the importance of further research and knowledge on how to realize benefits from IT investments.

Gomes et al. (2014) claim that this "productivity paradox", the gap between expected benefits and realized benefits, comes from the fact that investments in technology do not always result in productivity improvements in organizations. Peppard et al. (2007) argue that organizations struggle to realize benefits from IT investments mainly because the focus is on implementing the technology rather than achieving the expected benefits. Research has shown that organizations generate a low return on IT investments, and IT has gotten a poor reputation among several organizations (Peppard et al., 2007). Peppard et al. (2007) also argue that IT has no inherent value, and according to Brynjolfsson and Hitt (1998), IT only generates benefits if the new IT is complemented with organizational change. The problem regarding low return on IT investments is largely caused by organizations focusing on the criteria such as if the investment is within budget and delivered on time, instead of identifying and following up benefits that should be realized (Peppard et al., 2007).

The question now becomes how companies can ensure that their desired benefits from IT investments become realized. Due to the lack of returns from IT projects, several principles and models have been created to help companies realize their benefits. For instance, Ward and Daniel (2007a) designed the process model, the Cranfield Model, based on the lack of methodological support for benefits management. Benefit realization management (BRM) and IT investments have been discussed in literature since the 1990s. We find that the subject again has flourished in line with the emergence of new technological innovations. As we have entered the fourth industrial revolution, implementing IT is increasingly becoming more critical for businesses. IT has been addressed as a "strategic weapon" that can produce superior performance through innovation (Porter, 2001) and thus can create sustainable competitive advantages (Ward et al., 2007). It is therefore a crucial factor for ensuring a long-term existence in today's competitive environment (Jugdev & Mathur, 2006).

To understand how information technology and systems create value, Cronk and Fitzgerald (1999) argue that one must look at several dimensions that affect the business value. Previous measurement methods have often been limited to a financial perspective, relating the investments to performance indicators such as ROI and ROA (Cronk & Fitzgerald, 1999). The authors suggest a broader perspective involving quantitative and qualitative components, divided into three dimensions to measure the business value. Companies can get a more holistic view of value creation by looking at the effects of an IT investment through the user-, system-, and business-dimensions (Cronk & Fitzgerald, 1999). Ward et al. (2007a) also argue that a focus on financially based appraisal approaches may be a contributing factor to the low benefit delivery from investments.

Other authors include that the proper benefit realization process entails an integrated solution approach. For example, Sanches et al.'s (2017) study uncover that a project's success depends on the interrelationship between factors, e.g., project management characteristics, team motivation, and project features (Sanches et al., 2017). Ward et al. (2007a) support this statement as they find that the organizational, process, and relationship changes create the benefits and need to be connected to the technological change.

3. RPA Supervisor and their software

RPA Supervisor is a Norwegian start-up company that was established in 2018. They aim to solve companies' problems regarding managing their intelligent automations, which help streamline their automations (RPA Supervisor, 2021). RPA Supervisor's software, which goes by the same name, is a digital automation manager that can prioritize and handle events 24/7. The supervisor can do this by using advanced analytics and notification. It monitors and orchestrates all aspects of the RPA operations, and the findings are displayed through a user-friendly interface. In this way, the entire organization is provided with real-time insight into the business operations, value creation, and the digital workforce's potential (RPA Supervisor, 2021). The digital automation manager also provides improved scheduling of processes that ensure optimal efficiency and resource utilization.

It can be complicated and overwhelming to handle the digital workforce, especially if it contains large numbers of licenses and processes. This can lead to a high total cost of ownership as it requires a lot of time and resources The efficiency gains of automation can therefore become equalized if managed manually. A solution to this problem can therefore be to implement the RPA Supervisor, Today, about 72% of companies manage and schedule their robots manually through the control room of the RPA tools, e.g., Blue Prism and UiPath (RPA Supervisor, 2021). The RPA Supervisor is a cloud or on premise solution and is 64-84% more effective at managing the robot workload than in-house or manual management. RPA Supervisors' clients mainly use the RPA tool Blue Prism, but in 2021, the tool has implemented support for UiPath and aims to support all the major RPA tools within a short period. The software's features and functionality differ slightly between different RPA tools due to their differences in robotic management and the RPA process development. Still, whether their customers use Blue Prism or UiPath, is irrelevant, as the primary function remains.

4. Theory

The thesis continues by describing the theoretical foundation. First, the chapter introduces the topic of lightweight IT projects, i.e., RPA, project outcomes, and appraisal approaches. Subsequently, it investigates benefit realization management (BRM) and briefly presents one of the topic's most well-known frameworks. Finally, the theoretical foundation for analyzing the development in profitability is presented.

4.1 Lightweight IT projects

Lightweight IT is a technology that is easy to use and primarily developed to support processes with simple applications (Bygstad, 2016). It is called "light" as the technology is cheap and easy to use. Lightweight IT is an experimental and innovation-oriented digitalization technology focusing on developing solutions quickly (Iden, 2018). In addition, lightweight IT is conducted by non-IT professionals, which means fewer IT resources are required.

Lightweight IT has had a growing interest as it is well suited for the tasks that heavyweight IT often fails to support (Bygstad, 2016). Heavyweight IT delivers back-end solutions such as ERP systems and other service-oriented architecture (Bygstad, 2016). Therefore, lightweight IT may be seen as complementary to heavyweight IT as it covers routine-based and simple tasks that support the user's immediate needs. This causes benefits to occur sporadically. A commonly used software within lightweight IT is Robotic Process Automation (RPA). Therefore, we define the implementation of the RPA Supervisor as an investment in lightweight IT.

Today's turbulent business environment forces organizations to address changes to ensure their existence. Due to trends such as resource scarcity, global warming, and rapid urbanization, organizations embark on transformation trends without knowledge of the expected benefits or how to realize them. Therefore, digitalization increases the need for project management as it provides a framework and techniques for analyzing projects. As a result, project management can increase benefits realization and profitability (Karlsen, 2021).

Implementation of the RPA Supervisor is a project that does not lead to a direct change in the organization's infrastructure but rather improves existing technology. Implementing the RPA Supervisor may be defined as an investment, and we will therefore characterize the implementation of the RPA Supervisor as a project. A project is necessary when an organization seeks a new solution or a new state and is defined as “a unique task that is designed to attain a specific result which requires a variety of resources and is limited in time” (Andersen et al., 2009, p. 10).

The definition: “Projects are a key way to create value and benefits in an organization” (PMBOK Guide, 2017, p.10) illuminates the link between projects and benefit realization management. The purpose of undertaking a project is the intended outcome, often described as a beneficial change (Karlsen, 2008). However, organizations need to start their projects with comprehensive strategic planning and management to create successful business value (Ozguler, 2020). A benefit realization plan aims to create, maximize, and sustain the benefits from a project (Ozguler, 2020).

4.1.1 Robotic Process Automation (RPA)

Although RPA has been around for some years, companies still need more knowledge about the software to exploit the total value of the technology. In the last years, this technology has almost become a necessity for companies aiming to remain competitive in the dynamic environment. Robotic Process Automation is a virtual robot that mimics human activity by performing structured and standardized tasks based on a set of clear rules and assumptions (Osmundsen et al., 2019), and it is described as a “cutting-edge innovation” (Kedziora & Kiviranta, 2018). Human workers may therefore focus on tasks that are more unstructured, value-creating, and that require discretion. The robot, also called a license, performs many of the same tasks as the human worker. For example, research has found that RPA works best to perform “swivel chair” processes or sub-processes, i.e., responding to E-mails or creating spreadsheets (Lacity & Willcocks, 2016a).

What distinguishes RPA from other automation tools is, according to Lacity and Willcocks (2016), that RPA is easy to configure, is non-invasive, and is enterprise safe. This implies that RPA is “simple,” as it does not learn by itself or look for ways to optimize processes. Furthermore, the robot is programmed to perform tasks in a specific order and has a user-friendly and intuitive interface, making it easy for non-technical personnel to handle it (Lacity & Willcocks, 2016b). In addition, the RPA software is not a part of a company’s technology structure but is implemented on top of the existing structure. This means that companies do not have to change their entire IT infrastructure, saving time and costs (Lacity & Willcocks, 2016a).

Based on previous research, we find that implementing RPA saves time which can be used to perform more cognitive and complex tasks (Lacity & Willcocks, 2016a). This makes it attractive for companies; however, critics believe that there are also disadvantages associated with the implementation of RPA. Customers encounter problems related to the initial implementation, and it is reported that 30 to 50% of RPA projects fail (Lamberton, 2016). Research shows that the most common issues in failed RPA projects are not considering RPA as business led, targeting RPA at the wrong processes, and assuming greater ROI by implementing the software (Lamberton, 2016).

A prerequisite for an efficient RPA implementation is that the technological infrastructure in the company is designed to meet future needs and that RPA is distributed in ways that fit the existing organizational structure and culture (Anagnoste, 2018). A centralized structure is a favorable model for RPA in which a Center of Excellence exists (Willcocks et al., 2015). This implies that the company has a holistic approach that ensures that technology implementation is supported with the necessary capabilities to drive RPA adoption in the organization. The Center of Excellence (CoE) can be defined as "a physical or virtual center of knowledge comprising existing expertise and resources in a discipline to attain and sustain performance and value" (Gartner, 2016). Organizing a separate RPA CoE can be valuable when implementing new RPA software. It allows the IT division to focus on more valuable activities and leave the focus around RPA to the CoE. The RPA CoE is responsible for all the functionalities of the RPA initiative. It contributes to achieving the company's automation goals and long-term efficiency by finding additional processes to automate (Anagnoste, 2018).

4.1.2 Project outcomes and appraisal approaches

Lightweight IT's experimental approach opens for different solutions which provide different outcomes and benefits for users (Bygstad, 2016). This can make it challenging to measure what impact such technology has on the company's profitability as the benefits will not co-occur. Technology by itself delivers little business value (Ward et al., 2007a), and benefits only arise when projects enable people to do things differently (Peppard et al., 2007). A benefit can be described as: "an outcome of change which is perceived as positive by stakeholders"

(Bradley, 2006, p. 102). The definition emphasizes that a change needs to occur, and a positive outcome must emerge to call the result a benefit.

A benefit can be divided into three categories: tangible, quasi-tangible, and intangible (Becerik, 2006). The tangible benefit is quantifiable and measurable, the quasi-tangible is quantifiable but challenging to measure, and the intangible is not quantifiable but has a significant business impact (Becerik, 2006). Another categorization of benefits is to define whether the realized benefit was intended or not as projects sometimes yield unexpected benefits. It is important to be aware that such benefits might occur as these are still valuable to realize and sustain in the organization.

Peppard et al. (2007) argue that all IT projects have outcomes, but not all outcomes are benefits. The definition of a benefit being a positive outcome for one stakeholder implies that it can simultaneously be a disbenefit for others. Disbenefit has several definitions in the literature and is a common term within the technology field (Fox, 2007). A disbenefit is described as "something that makes a situation disadvantageous or unfavorable" (Fox 2008, p. 1201).

The risk of an undesirable outcome occurring can be reduced by assessing the risks through a risk analysis. The risk analysis estimates both the likelihood of an undesired outcome to occur as well as the effect the outcome will have on the company's profitability. The software's potential vulnerabilities must be analyzed to determine the probability of such an outcome. This helps reduce the probability and impact of occurrence (Stoneburner et al., 2002).

Since the risks associated with an investment in the RPA Supervisor predominantly constitute the operational risk, this is the risk we will focus on. Operational risk is defined as "the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events" (Baijal, 2021, p. 253). Thus, the operational risk is based on both inadequacies within processes and internal systems, as well as human error. We will disregard the risk of the external events in this thesis as this risk is not impressionable.

To define a project as "successful" or "unsuccessful" relates to the investment's expected return and risks and is based on which appraisal approach has been used. Jenner (2010) argues that treating projects as investments helps to shift the focus towards success not being equal to the delivery of the project but the realization of benefits. Furthermore, research presented in Jenner (2010) shows that 78% of companies consider their investment appraisal process ineffective. This raises the question of which method is the right to use.

Assessing the success of a project is traditionally a matter of how the outcome affects financial indicators such as payback period (PP), internal rate of return (IRR), or net present value (NPV). The financial approach provides useful measures, but problems are associated with such an approach (Jenner, 2010). For instance, difficulties determining the monetary value where no market prices exist may lead to prediction errors. Moreover, when initiating a project, it can be risky to focus on the financial return of the investment as it confuses a financial return with benefits that have an economic value (Jenner, 2010). This may steer the focus away from managing the investment to achieving benefits and business value. Therefore, having a non-financial focus may lead to more benefits being realized.

The positive outcomes of a project will generate business value for an organization. Business value can be defined as the net benefit that will be realized by the customer of a project and consists of both tangible and intangible benefits (Phillipy, 2014). However, there is no definite answer to what business value is or how it is created (Karlsen, 2008). Implementing the RPA Supervisor will affect the business value, and according to Cronk and Fitzgerald (1999), there are three dimensions of business value. These are the system-dependent dimension, the user-dependent dimension, and the business-dependent dimension. The system-dependent dimension adds value to the organization through system characteristics such as response time, downtime, and accuracy (Karlsen, 2008). The user-dependent dimension adds value through the user characteristics, i.e., improved skills, while the business-dependent dimension adds value through business factors such as business goals (Karlsen, 2008). This type of categorization provides insight into which aspect of the business is affected.

4.2 Benefit realization management (BRM)

The most important thing to successfully invest in new technology today is not to fulfill the deadlines, budget demands, or quality requirements, but to realize the desired project benefits (Karlsen, 2021). Therefore, it is essential to focus on the project’s benefits throughout the life cycle to yield the desired benefits. This can be done through benefit realization management. Benefit realization has its origins from the mid-1990s and emerged as a reaction to the lack of realization of benefits from Information Systems/Information Technology (IS/IT) investments (Semman & Böhmann, 2015). Benefit realization management can be defined as “the process of organizing and managing such that potential benefits arising from the use of IS/IT are actually realized" (Ward et al., 2007b, p. 2). Newer research defines benefit realization management as "the process of organizing and managing so that the potential benefits arising from investments in change are actually achieved" (Bradley 2006, p. 29).

The BRM process helps companies survive in a changing environment without putting the existing business goals at risk (Lahmann et al., 2016). Benefits management is presented as an analytical approach that illustrates the results of a project and describes the process from the project's start until the benefits are realized. Same as for the term benefit; within benefit realization management, a change needs to occur to extract value from a project. However, for organizations to extract the expected value from a benefit, it needs to be realized to a sufficient degree and on time (Ozguler, 2020). Therefore, benefit realization management is necessary for organizations that undergo change projects to realize expected benefits. An organizational change is often necessary to collect the desired benefits and extract value from a project (Karlsen, 2021). According to Bradley (2006), benefit realization management should be exercised in any measure requiring change. "Benefits come when people do things differently and when IT-enabled business change has been planned to realize benefits for customers, staff, the organization, and other stakeholders" (Ashurst and Hodges, 2010, p. 227).

Lack of realizing benefits from IT investments mainly comes from companies not using BRM while undertaking projects (Peppard et al., 2007). Most organizations investing in IT focus on cutting costs and staying within budget limits to achieve high ROI-calculations (Peppard et al., 2007). In that way, they might overlook some of the significant benefits IT can deliver, as well as how it is creating business value. Previous studies show that organizations are often dissatisfied with their yield on IT investments. Statistically, about 75% of transformations do not meet their goals, whether in terms of benefits, timing, or both (McAfee, 2003; Markus, 2004). Some of the trends that may have contributed to this result are that IT investment appraisal approaches are often financially based, and the focus of the implementation methodologies is often on the technical aspect and not on the business change (Ward et al., 2007a).

The Cranfield Benefits Management model was created as a framework to handle the emerging challenges regarding IT investments (Semman & Böhmann, 2015). The Cranfield model is a method to achieve and anchor the knowledge gained from the benefits management process, which helps to prolong the positive effects (Semman & Böhmann, 2015). This model was derived by Ward et al. in the early 1990s and may be seen as a comprehensive framework. There have been several developed frameworks to complement the Cranfield model in recent years. However, these models are based on IS/IT investments (Ward et al., 2007a), and our research has not revealed any techniques specifically made for lightweight IT.

4.3 The theoretical foundation for measuring profitability

Profitability is a measure of an organization’s profit relative to its expenses (Gartner, n.d.). Profit is often the primary motive for measuring profitability. However, as the existing literature indicates, a financial focus on extracting benefits from IT investments might not lead to an increase in profitability. The growing focus on costs and return causes companies to fail with their IT investments due to a lack of focus on business benefits and non-financial assets (Karlsen, 2008). Therefore, we have chosen to investigate profitability in other terms than merely financial metrics such as ROI. By doing so, we get a broader perspective of the factors that have contributed to a change in profitability. We focus on how the business value has changed due to changes in benefits and risks, and we also examine the causal relationships between the benefits. The focus on business value will also provide insights into a company’s long-term success and help them thrive in the dynamic business landscape (Mankins, 2017). In our case, this is a suitable approach as it is challenging to differentiate the isolated impact of the RPA Supervisor’s implementation on profitability. Our investigation also does not consider when the benefits are realized as we have a cross-sectional study.

To identify how the customers’ profitability has been affected through implementing the RPA Supervisor, we will present the relationship between profitability, benefits, and risks. The profitability can be calculated as the sum of benefits minus risks, which is a function (F) of the following parameters:

$$\pi = F(k, l, m, n, o, p, q, r, R) + \varepsilon \tag{4.1}$$

Where:

π: Profitability caused by investing in RPA Supervisor
k: Operational FTE costs
l: Monitoring of the digital workforce
m: Management of the digital workforce
n: Manual routine-based tasks
o: Stability of services
p: Employee satisfaction
q: Robotic capacity
r: Efficiency in the digital workforce
R: Risks related to the implementation of RPA Supervisor
ε: Residual

In addition to the variables above, an investment cost should also be considered. However, as this thesis aims to examine the development in profitability, we chose to disregard the investment cost as it is non-recurring and will not be an influencing factor to the profitability in a long-term perspective.

The profitability is the difference between benefits and risks and is shown below:

$$\pi \rightarrow (k + l + m + n + o + p + q + r - R) + \varepsilon \tag{4.2}$$

Equation (4.3) shows the relative weight of each parameter expressed as $(\alpha + \cdots + \lambda = 1)$. The residual (ε) captures the variation within the parameters the model is unable to capture and hence is not weighted.

$$\pi = (\alpha k + \beta l + \gamma m + \zeta n + \eta o + \theta p + \iota q + \kappa r - \lambda R) + \varepsilon \tag{4.3}$$

We add a residual as the model will depend on other parameters than we have shown. A residual is a deviation between predicted and observed values (Johannessen et al., 2016). The omitted variables can cause variation within the model and lead to skewed estimates; however, the variation will reduce by including a residual. In addition, the residual also captures that the value of the weights may change.

Development in profitability can also be shown as the difference between the profitability with and without implementing the RPA Supervisor. The profitability is the difference between the desired outcome and the current state and is expressed in the equation:

$$\pi = \pi^{RPAS} - \pi^{WRPAS} \tag{4.4}$$

The change in profitability is expressed as $\partial\pi$ and will depend on the change in the parameters:

$$\partial\pi = (\alpha\partial k + \beta\partial l + \gamma\partial m + \zeta\partial n + \eta\partial o + \theta\partial p + \iota\partial q + \kappa\partial r - \lambda\partial R) + \varepsilon \tag{4.5}$$

Equation (4.5) shows that a marginal change in profitability depends on a marginal change in one of the independent variables. Therefore, to investigate whether the implementation of the RPA Supervisor leads to an increase in profitability, we compare the profitability with the implementation with the profitability without the implementation. This could be formulated in an operational equation in the research literature and is shown below (Bateman, 1935).

$$\partial\pi = \frac{\delta\pi^{RPAS}}{\delta\pi^{WRPAS}} = f\left(\frac{\delta k^{RPAS}}{\delta k^{WRPAS}}, \frac{\delta l^{RPAS}}{\delta l^{WRPAS}}, \frac{\delta m^{RPAS}}{\delta m^{WRPAS}}, \frac{\delta n^{RPAS}}{\delta n^{WRPAS}}, \frac{\delta o^{RPAS}}{\delta o^{WRPAS}}, \frac{\delta p^{RPAS}}{\delta p^{WRPAS}}, \frac{\delta q^{RPAS}}{\delta q^{WRPAS}}, \frac{\delta r^{RPAS}}{\delta r^{WRPAS}}, \frac{\delta R^{RPAS}}{\delta R^{WRPAS}}\right) \tag{4.6}$$

Where each parameter x > 0.

The aggregated effects of these parameters are shown below. Each of the parameters has a relative weight where (a + b + …. + i) = 1. We will in our thesis focus on whether the independent variables cause development in profitability, but we will not go further in detail on how much each parameter weighs. It can be challenging to estimate the effect of the individual parameter on profitability because the benefits are interrelated. The aggregate of the parameters explains why the profitability has increased after implementing the RPA Supervisor (Grytten & Liland, 2021).

$$\partial\pi = \frac{\partial\pi^{RPAS}}{\partial\pi^{WRPAS}} = f\left(a\frac{\partial k^{RPAS}}{\partial k^{WRPAS}} + b\frac{\partial l^{RPAS}}{\partial l^{WRPAS}} + \cdots + h\frac{\partial r^{RPAS}}{\partial r^{WRPAS}} - i\frac{\delta R^{RPAS}}{\delta R^{WRPAS}}\right) + \varepsilon \tag{4.7}$$

Each parameter is analyzed below to investigate the relationship between the benefits, risks, and profitability. We have elaborated on the parameters based on information provided by RPA Supervisor, their market research from 2020, and existing literature. We will subsequently illustrate how the benefits relate to one another, as well as how the parameters influence profitability.

Operational FTE costs

From the basics of accounting, the financial perspective of profitability equals income less expenses. By implementing the RPA Supervisor, several manual tasks will become automated, which frees up resources and reduces costs. The freed capacity will get an alternative application, meaning more value-creating tasks can be completed at a lower cost. Since one RPA robot can perform tasks equivalent to two to five humans, the savings in FTE costs are potentially significant (Lacity & Willcocks, 2015). Reduced operational FTE costs will affect profitability directly by improving the EBIT.

Monitoring of the digital workforce

Improved monitoring caused by advanced analytics provides valuable information about the business operations and improves efficiency (RPA Supervisor, 2021). The software provides data on the RPA's most important areas, e.g., value creation, license utilization, trends, and SLA's adherence. The data are illustrated in a web-based dashboard. As a result, the digital workforce can be supervised with more insight and control. The users' focus can be to improve the operations rather than monitor them.

Management of the digital workforce

The tasks regarding management and orchestration of the digital workforce are better performed. The orchestration of the robots becomes AI-driven and improved as the scheduling of each RPA process is replaced by SLA's that manage and optimize the schedule automatically 24/7. The RPA Supervisor fully automates all of the RPA operations. Improved and more efficient management and orchestrating will lead to more tasks being solved quicker, which will lead to fewer resources spent on these activities. Since many of the tasks in the RPA CoE will be automated, the employees can focus on new areas that can contribute to long-term growth and profitability.

Manual routine-based tasks

As large parts of the monitoring, managing, and orchestrating part of the digital workforce will be automated, the amount of manual routine-based tasks the employees must do becomes reduced. This, in turn, may cause an improvement in employee satisfaction and will potentially save much time.

Stability of services

The software enables the digital workforce to work more stably as it handles operational issues (RPA Supervisor, 2021). The RPA Supervisor adds more capabilities to the supervision of the RPA, which leads to a more responsive and stable workforce. In addition, the robots require less human interference as fewer errors occur. This will strengthen the digital workforce's monitoring, management, and orchestration.

Employee satisfaction

Since it can be perceived as frustrating to work with routine-based tasks and deal with errors, implementing the RPA Supervisor may increase employee satisfaction. The employees will be relieved of doing these tasks, and the improved stability leads to smoother operations. Research shows that challenging tasks leads to higher motivation and efficiency among employees (Preenen et al., 2014). The profitability may therefore increase as the employees can, to a greater extent, use their creativity and work innovatively rather than spending time on repetitive tasks.

Robotic capacity

The RPA Supervisor enables the companies to handle more robots and processes. This implies that an increasing number of processes can be automated and thus completed at a lower cost. This will increase the effectiveness of the organization’s processes and will provide greater flexibility and resource utilization. In turn, this improves profitability as the operational FTE costs decrease.

Efficiency in the digital workforce

Increased efficiency of the digital workforce is a benefit that emerges because of changes in operations. When tasks are completed faster and more accurately, the employees’ focus can switch to more value-creating assignments that cause increased profitability. More efficiency in the digital workforce means an increased quantity of completed processes, improving resource utilization.

Risks

Since investing in IT may also have adverse outcomes, the profitability will also depend on risks associated with implementing the RPA Supervisor. These risks will affect profitability negatively if they occur, and the profitability of implementing the RPA Supervisor will not be positive if the risks’ negative value exceeds the total positive value of the benefits. The risks can be of different nature and scope and may affect profitability to varying degrees. We will explain the consequences and the probability that the risks arise further in the discussion.

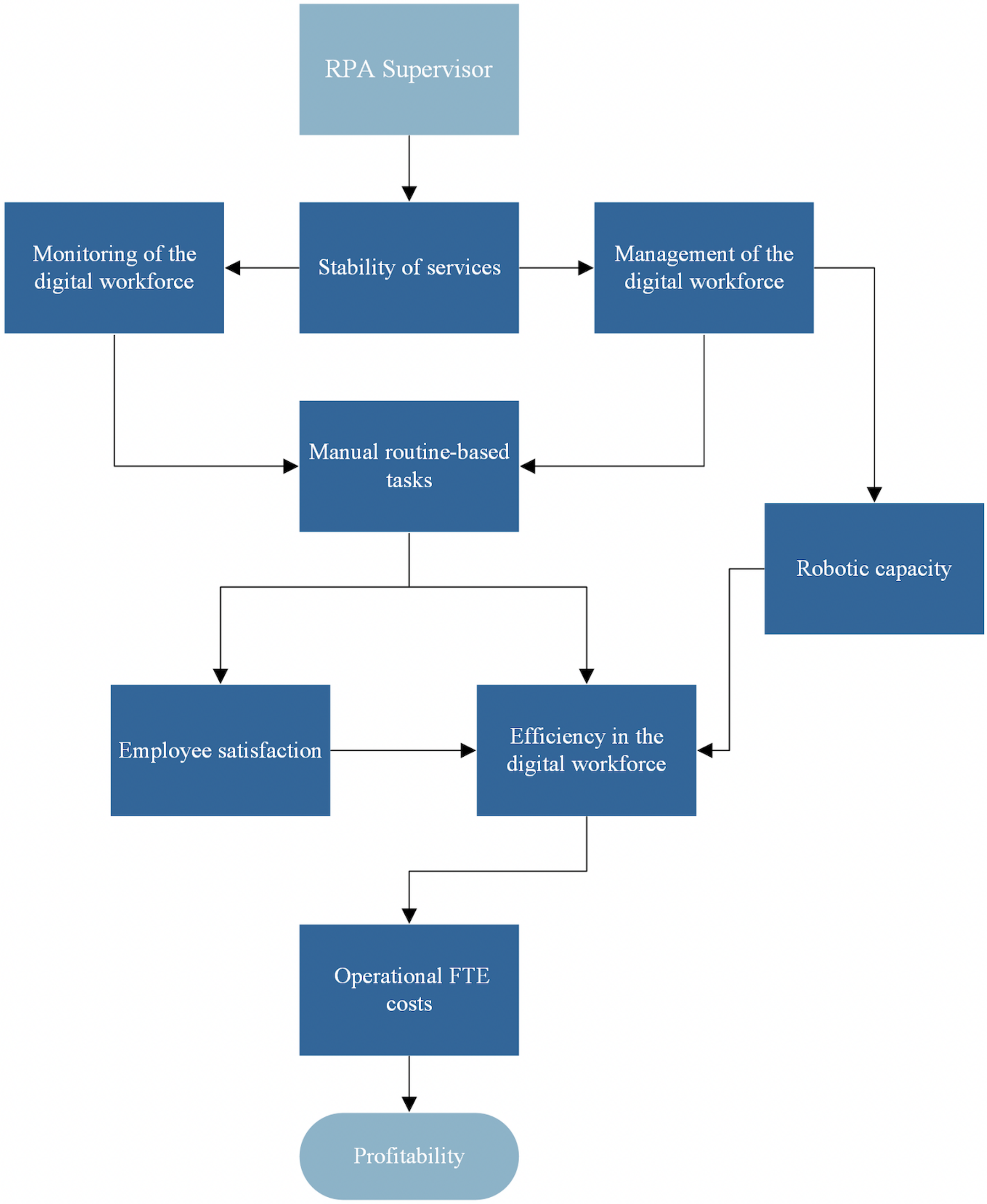

Figure 4.1: Flow chart of the benefits' causal relationship

The flow chart shows the causal relationships between the benefits and their impact on profitability. The RPA Supervisor improves the monitoring, management, and orchestration of the company's digital workforces as the software leads to more stable services. When tasks regarding monitoring and managing the robots are automated, the workload required for manual routine-based tasks is reduced. This leads to increased satisfaction among employees. Increased employee satisfaction and robotic capacity, as well as a reduction of manual tasks, will overall contribute to increased efficiency. This is because the sum of tasks that must be done is reduced, and the tasks are done faster due to higher motivation and greater capacity. In addition, the tasks are solved with higher precision and entail fewer errors than before. Combined, these benefits will reduce the costs associated with RPA operations. In this way, the companies can reach the strategic objective of increasing their profitability. We can more easily understand how benefits lead to profitability through this flow chart, and we gain insight into the interdependencies between the different elements. Still, it is essential to keep in mind that this is a simplified model and that the actual causal relationship probably is more complex than what our model shows.

The gap between expected and achieved benefits prevents many organizations from extracting value from projects. By not realizing the expected benefits, companies will not achieve the desired increase in profitability. According to Peppard et al. (2007), the solution for closing this gap is to apply benefit realization management. This supports the fact that benefits do not arise by themselves but need to be worked with throughout the project to obtain their total value. The gap between expected and realized benefits is shown in the model below and is referred to as the “productivity paradox” (Gomes et al., 2014).

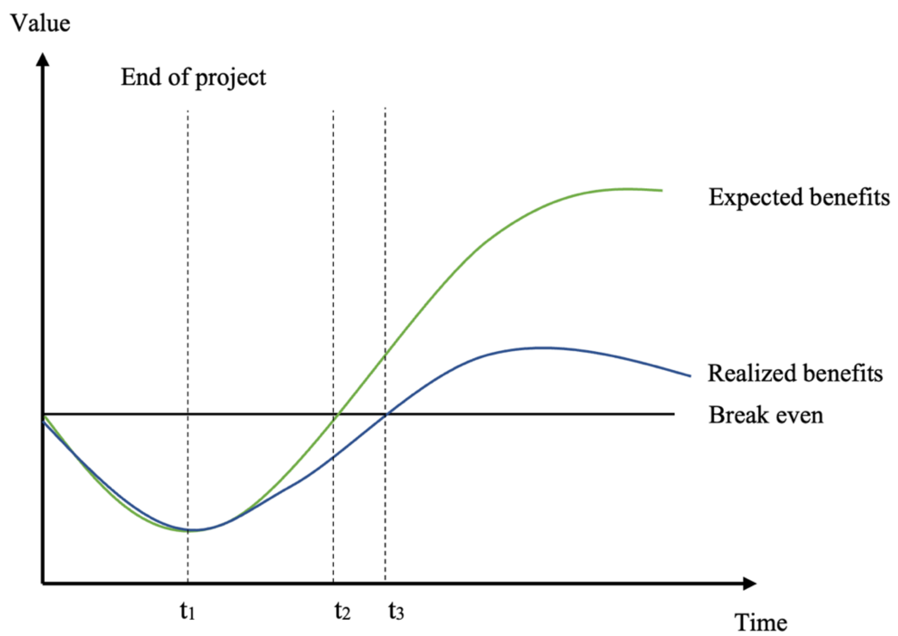

Figure 4.2: The discrepancy between the expected and achieved benefits (based on Karlsen, 2008)

The model illustrates that at the end of a project, t_1 is where the benefit realization starts. The investment is expected to be paid back and break even in t_2. However, in practice, the investment does not break even before t_3. This implies that a difference arises between expected benefits (green line) and realized benefits (blue line). A project aims to match the two lines, i.e., the realized benefits equal the expected.

According to Karlsen (2008), this gap will continue to occur for companies that do not change their benefit management principles from the traditional ones where the perspective is based on financial returns. The benefit realization should have a proactive approach where all investment outcomes are considered to close this gap (Karlsen, 2008).

5. Methodology

This chapter starts by presenting the approach and design we have used to conduct this thesis. Then, we continue by explaining how we have collected our data as well as how we have analyzed our findings. Finally, we wrap up the chapter by discussing our research's quality through the analysis's reliability and validity.

5.1 Research design and data collection

Our research follows a deductive approach as we have developed our research questions and expected findings based on existing studies and literature before collecting our data (Saunders et al., 2016). This method explains the cause-effect relationships between concepts and variables as the conclusions are based on theory. This is highly relevant for our research question as we want to investigate how profitability has developed. Furthermore, this thesis also seeks to discover if the outcome from implementing the RPA Supervisor substantiates from the theory regarding low return from IT investments. Therefore, a deductive approach is the most appropriate as the empirical findings are compared with the reality (Jacobsen, 2018). For this reason, we started to review the existing literature regarding IT investments, benefit realization management, and RPA before we designed the structured interview.

5.1.1 Research purpose and approach

Our thesis has an exploratory and descriptive design in a comparative analysis to answer our research question. We use an exploratory design as we ask open questions to gain insight into our topics of interest, and by that clarify our understanding of the phenomena (Saunders et al., 2016). We conduct exploratory research by investigating previous literature and interviewing "experts" in the subject, i.e., RPA Supervisor's customers. While the purpose of an exploratory design is to unveil new insight, the purpose of a descriptive design is to make a detailed profile of an event or situation (Saunders et al., 2016). For example, the descriptive design investigates how a change in benefits and risks affects companies' profitability. Using the two methods combined, we get a clear overview of the phenomena we seek to investigate.

This thesis follows a combination of a quantitative and qualitative approach as we use a questionnaire that consists of both open and closed questions. The two approaches complement each other as they allow us to take advantage of a structured questionnaire with standardized and open answers (Jacobsen, 2018). Using qualitative and quantitative methods provides a richer approach to the data collection.

5.1.2 Research strategy

Our research strategy aims to choose a strategy that enables us to answer our research questions and meet our objectives (Saunders et al., 2016). Our strategy is to collect primary data from a structured interview based on a questionnaire with both open-ended and closed questions. This strategy is associated with a deductive research approach. Our data collection will provide an adequate foundation for our further investigation as the questionnaire provides both quantitative and qualitative answers.

Our primary data investigates a particular phenomenon at a particular time and is therefore cross-sectional (Saunders et al., 2016). Some disadvantages regarding this strategy are that it can be challenging to create a good questionnaire as it offers only one chance of collecting data (Saunders et al., 2016). Therefore, thorough preparation of the questionnaire has been necessary.

5.1.3 Data acquisition

We collected our primary data from a questionnaire answered by RPA Supervisor's customers. Jacobsen (2018) differentiates between open and closed data collection, and as our research design is a predetermined structured interview, our data acquisition has a closed approach.

The structured interview is a self-completed questionnaire that RPA Supervisor distributed to the respondents through E-mail. Such active dispatch of the survey is more comprehensive, and as we have access to the respondents' E-mail addresses, this method is effective. To make the survey as understandable as possible, we have operationalized the terms we want to measure. This is done by introducing the questions with a short explanation for each topic. Furthermore, by operationalizing the phenomena in the survey, the assumption of intersubjectivity is maintained. This implies that the possibility that the respondents will perceive the questions in the same way is high (Jacobsen, 2018). In addition, the questionnaire logically structured by starting with a few demographic questions, followed by questions divided into categories.

In preparing the survey, we reviewed theory regarding benefit realization management and IT investments which contributed to an improved question formulation. Our questions were then categorized. Thus, we gained the advantage of formulating the expectations regarding which information was relevant (Jacobsen, 2018). We chose to use both closed and open questions. Our open questions do not collect standardized information, and we potentially get only different answers. Even though, we chose this method as we do not have a thorough overview of every possible response option.

The questionnaire consists of 18 questions, in which 6 of them are demographic. The other questions are categorized by topic, and we initiate by asking the respondents about benefit realization and risks. We ended the questionnaire by asking how satisfied the customers are with the product. Some of the questions we asked were on a nominal measurement level with "Yes"/"No"/"Don't know"/"Other" as alternatives, some were at an ordinal measurement level, and one question had metric answer alternatives (Jacobsen, 2018). The rationale behind adding the alternative to answer "Don't know" is that many of the respondents might not have sufficient knowledge about all the topics or might not want to answer for different reasons. We did not want to force anyone to respond if they did not know how to respond. However, we are aware that such alternatives may lead to some people ticking "Don't know" because they want to refrain from answering or do not want to spend time on the survey. Although, when ticking the "Other" alternative, a text box comes up, making it possible to get more in-depth answers.

Furthermore, we have formulated the questions in the most objective way possible. We have not asked too similar or double questions to prevent the participants from refraining from answering or answering without thinking it through. Finally, we have avoided misleading questions. We tested and improved the survey by sending it back to RPA Supervisor before sending it to the customers. By collaborating with RPA Supervisor, we were able to carry out pre-tests where unclear questions and time consumption was identified.

5.2 Data analysis

Data analysis refers to the use of different methods to analyze data so they can be used to answer our thesis' research questions (Jacobsen, 2018). The open-ended questions gathered from our survey required additional analysis as we got unique answers from every respondent. Therefore, we had to examine the answers prior to the data analysis.

5.2.1 Content analysis

Before analyzing our open-ended questions, we conducted a content analysis. By following a content analysis, the answers from our structured interview were reduced to a set of fewer but more general and meaningful categories (Jacobsen, 2018). Therefore, we used content analysis to code and categorize our qualitative data to analyze them quantitatively (Saunders et al., 2016). The categorization enabled us to simplify and structure our findings and make it possible to compare and analyze our answers.

We conducted a first- and second-cycle coding to gather similar answers (Jacobsen, 2018). In the first-cycle coding, we simplified the answers that were particularly long and well-completed. Then, in the second-cycle coding, we created new categories that collected several answers based on our data. In other words, we merged the respondents' answers and found a common perception and description that was valid for several of the answers. The choices made in this process were based on the response but were also influenced by our subjective interpretation and input from RPA Supervisor. We coded and categorized the answers regarding benefits and risks.

To make sure both the categorization and coding were done correctly, we controlled the categorization. The control served as a guarantee that we had included all relevant answers and statements. As RPA Supervisor reviewed the categorization, we felt confident that our interpretations were correct. The answers from our structured interview are categorized in Appendix 1 and 2. To illustrate our procedure for the data analysis more efficiently, we have designed a graphical representation:

Figure 5.1: Procedure for data analysis

5.2.2 Data

We have presented our data through descriptive statistics to describe and compare our findings (Saunders et al. 2016). After the categorization, we analyzed the statistics in Excel. We conducted a univariate analysis by looking at the statistical measures for central tendency such as median, mode, and mean, and we illustrated our findings in frequency tables and bar graphs. We also examined the distribution by looking at the spread through maximum and minimum values. Furthermore, we conducted a bivariate analysis to find correlations between some variables by displaying the findings in cross-tabulations (Johannessen et al., 2016). The descriptive statistics enabled us to present the relevant data in tables and figures.

5.3 Research quality

This subchapter will evaluate our methodology's quality in terms of validity and reliability. Our data collection must fulfill two requirements to be of high quality: to be valid and relevant, and to be reliable and trustworthy (Jacobsen, 2018).

5.3.1 Reliability

Reliability is a question of whether we can trust the data we have collected (Jacobsen, 2018). It concerns the accuracy of the data and how reliable our results are. In other words, reliability is concerned with the robustness of our survey (Saunders et al., 2016). According to Hard and Ford (2014), between 5-9% of survey respondents do not read the instructions attached (Saunders et al., 2016). This, as well as missing answers, can affect the survey's results.

There is often a significant drop-out rate in web-based surveys, resulting in a low response rate (Jacobsen, 2018). Web-based surveys have been shown to having a response rate of less than 10% (Jacobsen, 2018). Still, this method works well for us as we relate to a selection of respondents familiar with the RPA Supervisor and the topics in our survey. We received 20 out of 51 possible answers. Therefore, our response rate of 39% is adequate as it is far above 10%. Measures we have taken to increase the response rate are to carry out reminders on E-mail, ensure anonymity, explaining the purpose of the study, and making sure the questionnaire was short and had a user-friendly interface. In addition, our scope consists of various companies as the customers are differentiated according to industry and size. This gives us more variation within the answers, bringing more reliability to the study.

5.3.2 Validity

In addition to reliability, Jacobsen (2018) requires that data should be internally and externally valid. Internal validity relates to whether our data indeed explains our assumptions and can relate to, e.g., whether our variables truly measure the change in profitability (Jacobsen, 2018). Hence, it relates to whether our study can demonstrate causal relationships or not. External validity is about the extent to which our findings can be generalized.

We investigated whether previous findings that support our data exist to ensure that internal validity is established. In addition, to minimize the risk that our survey does not provide adequate coverage of the investigative questions, we have been in close dialogue with RPA Supervisor. They have helped us sort out which questions are necessary. A valid survey mainly emphasizes the importance of being confident that the respondents interpret the questions in the way we intend. This has required us to go through our survey repeatedly and thoroughly before sending it out.

6. Description of profitability and technology in the Norwegian market

This chapter begins with a description of the development of historical profitability in Norwegian companies. We investigate a ten-year period from 2010 to 2020 to uncover trends in profitability. Then, we present statistics of the use of AI-driven technology within Norwegian companies to examine similarities and differences to other technologies.

6.1 Historical development of profitability

The historical development of profitability illustrate how profitability varies from year to year based on four different profitability measures. Since our respondents are Norwegian companies from different sectors, we find it relevant to investigate companies from all sectors. The four performance measures presented are commonly used in companies' annual reports on the Oslo Stock Exchange. Return on equity was most used as 29% of the companies included it in their reports, followed by EBIT margin which was reported by 25% of the companies (Hansen, 2017).

Our data are gathered from Statistics Norway and shows how the performance measures return on assets (ROA), return on equity (ROE), EBIT margin, and profit margin have evolved. In other words, we look at both profitability measures and margins. The EBIT margin and profit margin explain profitability as a share of turnover, whereas the return on assets and equity shows profitability as a share of capital (Hansen, 2017). Therefore, the measures reflect the effect of the operations on the companies' profitability.

We illustrate the data in the figure below, which shows how the key measures for profitability have developed over the last ten years for Norwegian companies in all industries.

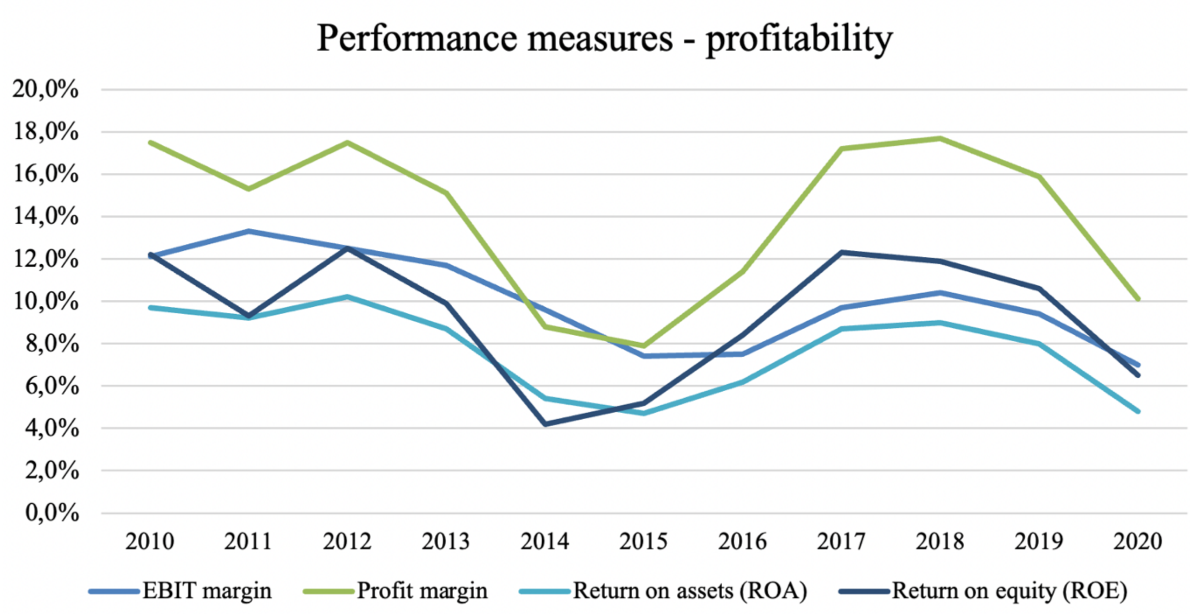

Figure 6.1: Development in performance measures

Source: Statistics Norway, 2021

The graph reveals fluctuations in profitability measures during the ten years. A volatile business landscape requires companies to prepare for constant changes and possible downturns. This emphasizes the importance of having an efficient and streamlined operation that serves as a buffer against loss. To study the figures more closely, we have created a table that shows the percentage change from 2015 to 2020. We calculate the annual average and the percentage change in the measures over the five years. This shows the level of profitability for Norwegian companies over the last five years and indicates how much we can expect profitability to develop in the upcoming years.

Key figures (%)	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**Average**
EBIT margin	7,40	7,50	9,70	10,40	9,40	7,00	
Change		0,10	2,20	0,70	-1,00	-2,40	**-0,08**
Profit margin	7,90	11,40	17,20	17,70	15,90	10,10	
Change		3,50	5,80	0,50	-1,80	-5,80	**0,44**
Return on assets (ROA)	4,70	6,20	8,70	9,00	8,00	4,80	
Change		1,50	2,50	0,30	-1,00	-3,20	**0,02**
Return on equity (ROE)	5,20	8,40	12,30	11,90	10,60	6,50	
Change		3,20	3,90	-0,40	-1,30	-4,10	**0,26**

Table 6.1: Key profitability measures 2015-2020

Source: Statistics Norway, 2021

On average, we find that the change in key figures is relatively small, but we see that the change can be considerable from year to year. Therefore, how well the operation is going is significant for how the profitability develops. This indicates that marginal changes in benefits and risks may considerably affect the companies' financial condition and thus determine whether the company is profitable.

6.2 The use of AI-driven technology

This subchapter introduces the use of Artificial Intelligence (AI) in Norwegian companies. AI is a similar technology to RPA and therefore interesting to examine to compare features. The investigation of the usage areas and barriers associated with AI technology gives a perception of the trends regarding technology adoption in the Norwegian market. This provides a better understanding of the current and future development of RPA Supervisors customers' profitability. Moreover, we get a new angle on the factors that drive and inhibit the implementation of new technology. By that, we get an understanding of how the technology may impact the companies' profitability.

The technological development entails greater expectations for the use of AI-driven technology. New results from Statistics Norway show that 11%, or 1 out of 10, Norwegian enterprises are using artificial intelligence in 2021, a four percent increase from 2020 (Statistics Norway, 2021). Furthermore, 7% of the Norwegian companies that do not use AI have considered using it (Statistics Norway, 2021).

The study found that the technology is used for several different operations, and we illustrate the findings below. However, the most prevalent area of use was process automation as 6% of Norwegian enterprises use this type of technology (Statistics Norway, 2021). These findings indicate that process automation is the most important feature within AI. Furthermore, as the RPA technology also automates processes, this supports Gartner's expectations that the RPA market will grow at double-digit rates through 2024 (Gartner, 2020). This also illuminates that the potential benefits of implementing RPA Supervisor are substantial as the trend shows that the digital workforce will increase in the time ahead.

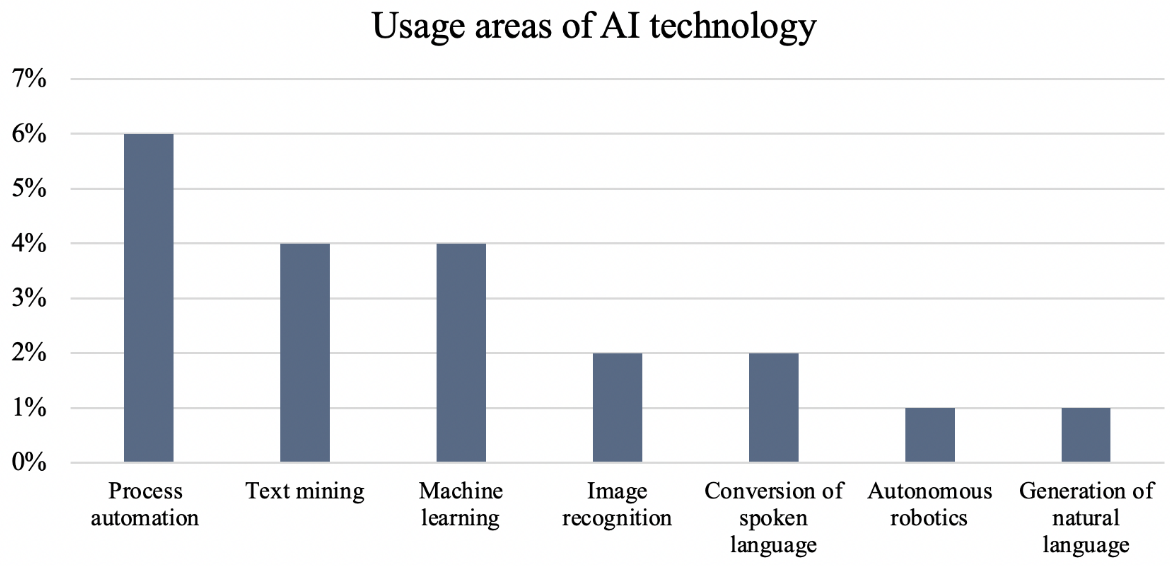

Figure 6.2: Proportion of enterprises using AI technology for different operations

Source: Statistics Norway, 2021

The study from Statistics Norway also found several barriers that keep companies from using AI technology. These are illustrated below. We find that lack of relevant competence accounts for the most prominent barrier as 58% of the companies stated it as an essential factor. Incompatible with existing systems was the second most important factor, followed by high costs.

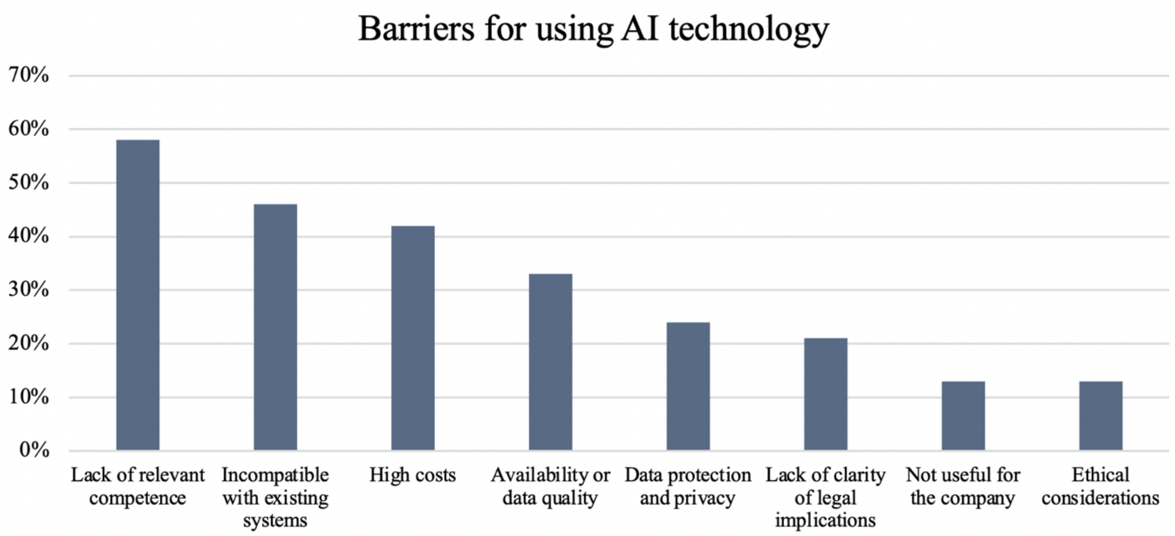

Figure 6.3: Barriers for companies considering using AI technology

Source: Statistics Norway, 2021

Figures from Statistics Norway also show that the proportion of companies that use artificial intelligence increases with company size. The results illuminated that AI technologies are used among 30% of larger companies, whereas only 8% of smaller companies only use one or more AI technologies (Statistics Norway, 2021).

7. Empirical findings

This chapter presents the results from the data collected through our structured interview. Our findings are presented through descriptive statistics, enabling us to systematize our results. Since some of our respondents answered the open questions more in-depth than merely keywords, we collected detailed data that supplement some of the descriptive statistics.

7.1 Analyzing descriptive statistics

The descriptive statistics is illustrated through a univariate and bivariate analysis where we present results from different statistical analyses. This gives a coarse presentation of the results and provides useful yet limited information. Since most of our questions are open-ended, we have categorized the answers prior to our analysis. The findings are presented in bar charts to map out the mode, and we also describe the variation in the distribution by calculating the mode percentage. The mode represents the central tendency and illuminates the most frequent answers (Jacobsen, 2018). Therefore, it is a relevant measure for the central tendency for most of our questions as they are on a nominal measurement level. Furthermore, we find the average response, as well as minimum and maximum scores for our variables at an ordinal and metric measurement level. Finally, some of the variables are analyzed through cross-tabulation to find possible relationships.

7.1.1 Organizational characteristics

We present some of the findings from our demographic questions in the tables below. Our respondents represented a range of different roles, and they are the employees responsible for the day-to-day RPA operations as well as the ones supervising the operations. Furthermore, they operate in various industries, e.g., banking, retail, and shipping. The respondents also vary with regards to company size, which is shown in table 7.1, as well as whether they have structured their RPA team as an RPA CoE. To investigate a possible relationship between these two variables, we have compared them in the cross-tabulation below.

	N	Average	Mode	Median
Company size	20	Medium	Large	Large

Table 7.1: Descriptive statistics – Company size

Company size	Structured as an RPA CoE (%)	Not structured as an RPA CoE (%)	Total (%)
Small (<1000 employees)	20	10	30
Medium (<5000 employees)	10	5	15
Large (>5000 employees)	50	5	55
Total	80	20	100

Table 7.2: Cross-tabulation of the structure of the RPA team by company size

We find that the average value of the companies' size is "Medium", although this is the category the least of the respondents belongs to. Thus, this does not provide any useful statistical information. Instead, we see that the most frequent answer, the mode, is "Large". Since the median also is "Large", this states that our population contains mostly companies with over 5 000 employees. Moreover, the cross-tabulation reveals that 80% of the participants had structured their RPA operational team as an RPA Center of Excellence (CoE). We also find that over 90% of the large companies had a separate RPA CoE. Our findings indicate a trend that shows that the larger the company is, the more likely the robotics team will be structured as an RPA CoE. This implies that larger companies are more focused on Robotic Process Automation and technology adoption.

From the questions regarding the respondents' RPA environment, we found great differences. The dispersion in the number of robotic processes ranged from a minimum of 5 to a maximum of 200, and the number of RPA licenses was between 1 and 100. The significant variation in the companies' RPA environments indicates that the companies are at different stages in their RPA journey.

7.1.2 Benefits

We received 95 benefits from our findings which we merged into nine categories. These categories include both expected and unexpected benefits. To analyze the mode of the answers, we illustrate the responses by relative and absolute distribution. The table below shows the frequency of each benefit category, and we see from the bar chart that the distribution is scattered. The statistics show that the breadth of variation within the distribution is 24, the mode is 26, and the mode percentage 27%.

	N	Min	Max	Spread	Mode	Mode percentage (%)
Benefits	95	2	26	24	26	27

Table 7.3: Descriptive statistics – benefits

Benefits	**Number (N)**	**Percentage (%)**
Less time spent on operational activities	10	11
More efficient implementation of new processes	5	5
Improved supervision of the schedule and the performance	17	18
Increased license utilization	10	11
Easier and more intelligent scheduling of processes	14	15
Improved reporting of performance	7	7
Improved performance of the digital workforce	26	27
Increased employee satisfaction	2	2
Cost reduction	4	4
Total	**95**	**100**

Table 7.4: Frequency table of benefits

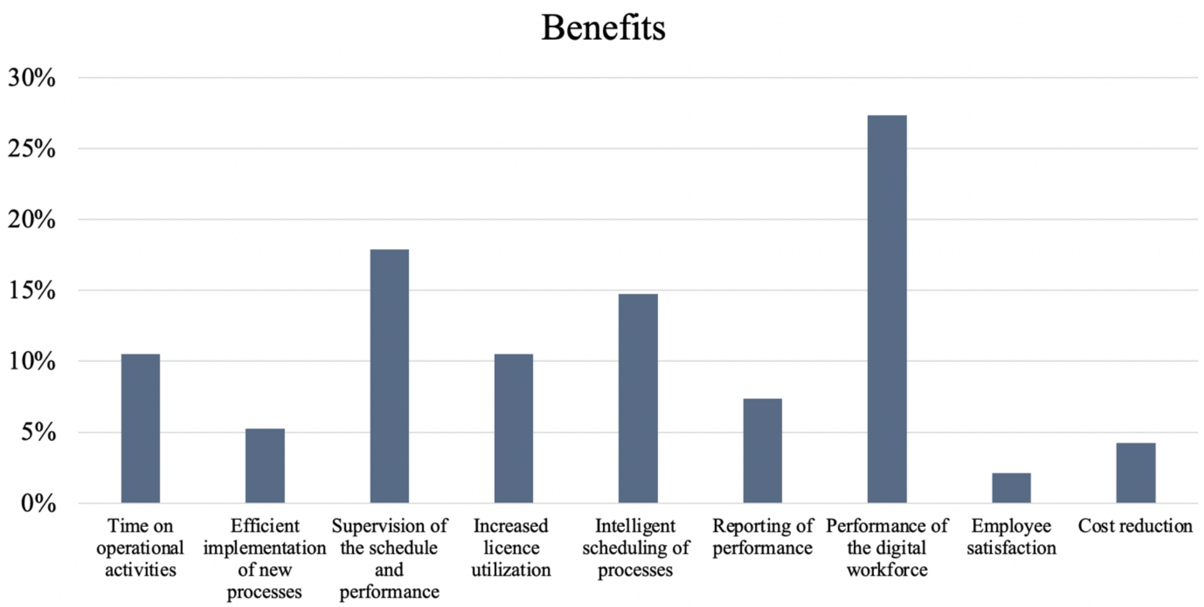

Figure 7.1: Percentage distribution of expected benefits (N=95)

Figure 7.1 shows that the mode of this distribution is "Improved performance of the digital workforce" as this is the most answered benefit. The two most frequently answered categories account for almost half of all responses. Since over 45% of our respondents replied that the "Improved performance of the digital workforce" and "Improved supervision of the schedule and performance" were some of their achieved benefits, we can argue that the operational aspect of the RPA is a focus area for many companies. Apart from that, the graph illustrates that the distribution is scattered across the remaining categories.

An interesting finding is that "Cost reduction" was one of the least mentioned benefits. Only 4% believe this is a benefit they will achieve from implementing the RPA Supervisor. This can be due to the respondents not being financially focused because of their position. However, it can also reflect their focus on creating business value rather than achieving financial benefits.

We also categorized the benefits according to whether they are quantifiable and easy to measure. 78% of the benefits are tangible and can be measured using key performance indicators (KPI). KPI's are quantifiable measurements that reflect the benefits to be achieved (Karlsen, 2008). "Increased employee satisfaction" and "Efficient implementation of new processes" are difficult to appraise and therefore constitute the intangible benefits which represent only 22% of the responded benefits. The benefits will affect the business value through the system-dependent dimension as they provide value due to the software's characteristics (Cronk & Fitzgerald, 1999). They create value by, e.g., reducing downtime, increasing accuracy, improving scheduling, monitoring, and performance which are factors belonging to the system-dependent dimension (Cronk & Fitzgerald, 1999).

Nevertheless, we categorized increased "Increased employee satisfaction" in the user-dependent dimension as it also adds value because of user characteristics. Furthermore, we argue that the benefits will either indirectly or directly contribute to achieving the companies' strategies, hence, we claim that the benefits are also business-dependent. Therefore, the benefits are cross-dimensional and affect the business value from all three dimensions. This creates a holistic form of business value for the organization (Cronk & Fitzgerald, 1999).

The respondents were then asked if they had achieved any unexpected benefits, and we found that 72% of the respondents had achieved unexpected benefits. The remaining 22% did not achieve any unexpected benefits, and 6% were unsure if they had. The most frequent answer about which unexpected benefits were achieved was regarding the "Improved performance of the digital workforce". This resembles our findings from figure 7.1 and substantiates

"Improved performance of the digital workforce" as the most important benefit for RPA Supervisor's customers. Most of the respondents achieved at least one unexpected benefit in addition to the other planned benefits. Respondents achieving unexpected benefits may be associated with the experimental approach of implementing lightweight IT. Since such an approach opens up for different solutions for implementation (Bygstad, 2016), the benefits achieved by the customers vary and can be distinct from the initially expected outcomes.

To investigate whether there are differences in which benefits have been achieved by company size, we have described the relationship between these two variables below.

Benefits	**Small (%)**	**Medium (%)**	**Large (%)**	**Total (%)**
Less time spent on operational activities	2	3	5	11
More efficient implementation of new processes	3	1	1	5
Improved supervision of the schedule and the performance	6	3	8	18
Increased license utilization	3	1	6	11
Easier and more intelligent scheduling of processes	4	1	9	15
Improved reporting of performance	1	1	5	7
Improved performance of the digital workforce	6	1	20	27
Increased employee satisfaction	1	0	1	2
Cost reduction	0	1	3	4
Total	**27**	**13**	**60**	**100**

Table 7.5: Cross-tabulation of benefits by company size

Table 7.5 shows that within small companies, both "Improved supervision of the schedule and the performance" and "Improved performance of the digital workforce" are the most common benefits. Together these two categories constitute 46% of the response mass for small companies. For the medium sized companies, the most frequently mentioned benefits are "Less time spent on operational activities" and "Improved supervision of the schedule and the performance". These account for 50% of the answers. Furthermore, 37% of the large companies have answered "Improved performance of the digital workforce", making it the most common benefit among large companies. The spread among the categories indicates that the focus on benefits differentiates companies regarding their size. In other words, companies have different expectations of what benefits will occur, and they will probably also have different outcomes affecting their profitability. This will therefore make it difficult to calculate the scope of each variable, as the influence of the profitability will vary from company to company.

Our interview was answered mainly by larger companies, which implies that their viewpoints have been emphasized above companies of small and medium size. Since 60% of our respondents were large companies, we can assume most of RPA Supervisor's customers are large scale companies. This supports Statistics Norway's findings regarding the correlation between company size and the use of artificial intelligence.

7.1.3 Risks

As for the benefits, we have also organized the total answers regarding risks into merged categories. The number of risks associated with implementing the RPA Supervisor sums up to 30 and are divided into 6 categories. The mode for this distribution is "Discrepancies in the performance of the software" and the mode percentage is 30%. We see a smaller variation in the distribution of risks, indicating that either fewer risks are associated with this software or that the typical risks are spread across fewer categories. The risks mentioned by the respondents can be classified as operational risks, including process and system risks. These risks negatively affect the companies' processes and systems, i.e., through project failure and technical issues.

	N	Min	Max	Spread	Mode	Mode percentage (%)
Risks	30	2	9	7	9	30

Table 7.6: Descriptive statistics – Risks

Risks	Number (N)	Proportion of respondents (%)
Lack of training	2	7
Fail in infrastructure	3	10
Discrepancies in the performance of the software	9	30
Dependency on RPA Supervisor (as a third-party)	6	20
General errors in the platform	7	23
Bad user experience	3	10
Total	**30**	**100**

Table 7.7: Risks

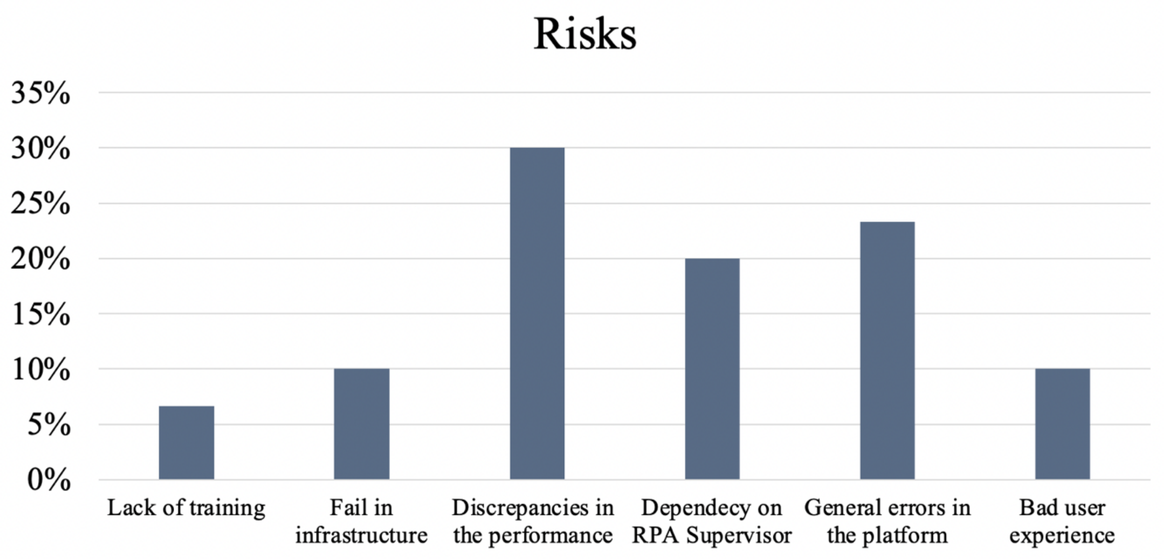

Figure 7.2: Percentage distribution of risks (N=30)

The graph illustrates several other prominent categories that also were frequently mentioned. The customers are concerned that general errors may occur and that they are significantly dependent on RPA Supervisor as a third party. "General errors in the platform" refers to common technical issues, e.g., delay in the software, network, or application server. This can be regarded as a typical risk among IT systems as technical issues often occur. "Dependency on RPA Supervisor" was the third most frequent response. This relates to the vulnerability, as one of the respondents stated, "*if RPA Supervisor goes down, everything stops*". The mode category involves, e.g., risks related to if the software or processes do not work as expected or the risk of losing control of the processes. "Lack of training" entails the risk of not learning how to use the software correctly and is the most rarely mentioned risk. This discovery supports the definition of lightweight IT being “easy to use” (Bygstad, 2016). The RPA Supervisor is a technology that does not create significant changes to the IT infrastructure.

We gained better insight into how the customers interpret the risks associated with implementing the software from the more comprehensive answers. Some of the respondents elaborated on why they believed the associated risks are low. For example, one stated that *“With schedules for the most pressing processes and good overall stability, the risks so far have been lower than the risk of errors in traditional schedules.”* Another interesting finding was: *“The customer service is really good, which means that all issues are normally resolved in a few hours”.* This indicates that the undesirable outcomes can be reduced to a certain degree due to customer service and stability in the software.

7.1.4 Benefit realization management

We found it interesting to investigate whether the customers had used benefit realization management (BRM) while implementing the RPA Supervisor and whether this had led to an increase in achieved benefits. These results examines whether BRM leads to higher benefit realization for lightweight IT projects.

Used a BRM plan	**Achieved all expected benefits (%)**	**Did not achieve all expected benefits (%)**	**Total (%)**
Yes	15	10	25
No	35	10	45
Do not know	30	0	30
Total	**80**	**20**	**100**

Table 7.8: Cross-tabulation of achieved benefits using BRM

We found that only 25% of the respondents had used a BRM plan, 45% had not, and as many as 30% did not know whether they had used one. Comparing these findings to whether the customers had realized all expected benefits showed that 60% of the respondents who used a BRM plan and 78% who did not use a BRM plan achieved all their expected benefits. This implies that using a benefit realization plan is unnecessary to realize benefits from implementing the RPA Supervisor as the majority achieved them regardless.

Nevertheless, of the 20% who did not achieve all the expected benefits, the respondents only mentioned one benefit each that was not realized. This indicates a marginal difference between the expected benefits that were realized and the ones that were not. Since a significant share of our respondents did not know if they had used a benefit realization plan or not, it is interesting to investigate possible reasons for this. One theory is that their educational background and position are IT-related and not business-related, which signals a lack of competence in this area.

We further wanted to investigate what may have been the reason for not realizing benefits. Our respondents replied that the reason was mainly due to high or wrong expectations and that it takes time to learn how to use and understand the software. However, 25% answered that the reason for not achieving benefits was because the display, monitoring, and data insight did not function properly.

To examine the effect a BRM plan has in this context, we asked the respondents who did not use a BRM plan if they believed more benefits would be realized if they had used such. Our findings revealed that 53% answered they do not think they would have realized more benefits if they had used a benefit realization plan. On the other hand, 37% answered that they would, and 11% did not know. This means that the majority do not find such a framework helpful, which our previous results also suggest.

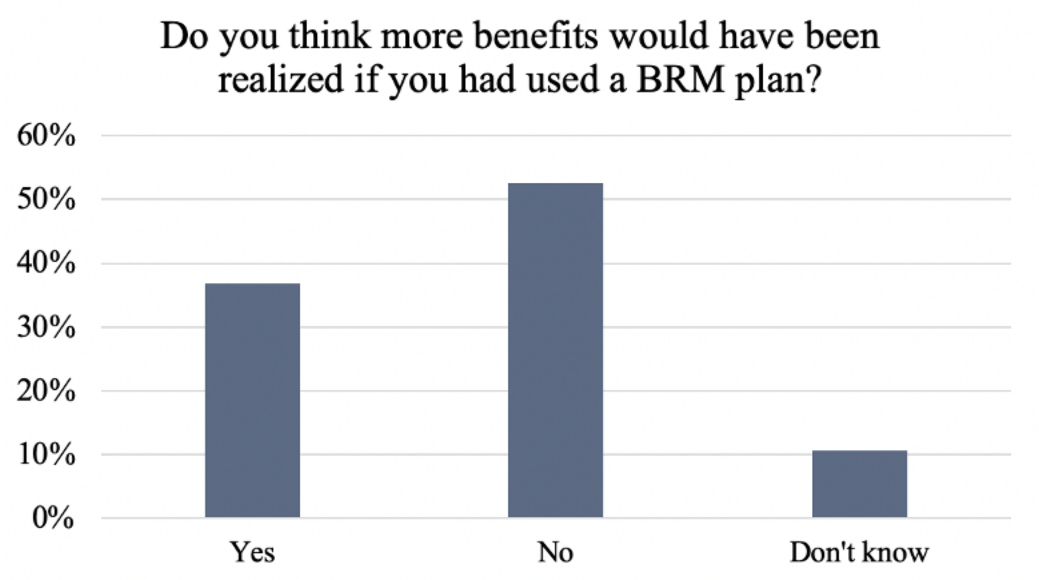

Figure 7.3: Participants perspective on the use of BRM (N=19)

7.1.5 User experience

We finished the questionnaire by asking a couple of questions regarding the customers' experience with implementing the RPA Supervisor and the software itself. 40% of the respondents found the software implementation easy, 55% found it moderate, and only 5% found it difficult. Moreover, the respondents were also asked to rate the platform from 1 to 10, where 1 equates low satisfaction and 10 indicates high satisfaction. All respondents rated the platform higher than 5, and on average, the value was 8.

	N	Min	Max	Spread	Average	Median
Rating	20	5	10	5	8	8

Table 7.9: Descriptive statistics – platform rating

Overall, RPA Supervisor's customers seem to have had a good experience with the software, and they found the implementation somewhere between "Easy" and "Moderate". An easy implementation is a characteristic of lightweight IT, and our results are therefore not unanticipated. Furthermore, great user experience might result from good customer support and a small proportion of risk associated with the investment.

7.2 Summary of the findings

Our analysis gives an insight into the key figures extracted from the study. It showed some of the viewpoints of RPA Supervisor's customers regarding their experience of the software and benefit realization. Our results suggest that the customers extract benefits of significant impact and that the different risks from the implementation are presumably low. Regarding BRM, we found it interesting that the majority assumed that benefit realization management was unnecessary for this implementation. In addition, the findings show that the company size may influence which benefits the company has focused on achieving. However, all the benefits presented contribute to increasing the business value through one or more dimensions. In the next chapter, we will discuss how these benefits affect the companies' profitability and whether they can cause an increase by exceeding the risks.

8. Discussion

This chapter will discuss and analyze the findings presented in chapter 7. Based on these results, we will answer our research question, *"How has the profitability of established companies developed due to implementing the RPA Supervisor?"* and determine whether previous research regarding lack of benefit realization within IT investments applies to our respondents. Our discussion is based on a comparative analysis that will illuminate profitability development. First, we substantiate and compare our findings with previous studies and literature, especially the theory of IT investments not leading to realized benefits. Subsequently, we discuss possible reasons why our results contradict previous research. The findings will also be compared against the historical development of profitability and the technological trends in the Norwegian market. Finally, we will explore benefit realization management and lightweight IT in the context of our results.

8.1 Comparative analysis

To investigate whether an investment in the RPA Supervisor has led to a development in profitability, we find it appropriate to conduct a comparative analysis. Through the analysis, we compare the profitability of companies with the implementation against the profitability of companies without the implementation. The case without the RPA Supervisor is a theoretical situation that is only used as a basis for comparison and is shown by π^{WRPAS}.

From the descriptive statistics in chapter 7, we find that 80% of RPA Supervisor's customers realized all the expected benefits. These statistics contradict the previous studies stating that almost 75% do not extract value from IT transformations (McAfee, 2003; Markus, 2004). For the customers of RPA Supervisor to achieve increased business value and profitability, the positive outcomes in terms of benefits must surpass the negative outcomes in terms of risks. Function (8.1) presents the profitability extracted from implementing the RPA Supervisor as the difference in the profitability in the case with and without the software.

$$\pi = \pi^{RPAS} - \pi^{WRPAS} \tag{8.1}$$

We will in our comparative analysis investigate if π is a positive value and thus if (8.2) is valid for RPA Supervisors customers.

$$\pi^{RPAS} > \pi^{WRPAS} \; if \; \pi > 0 \tag{8.2}$$

In a scenario where the RPA Supervisor is not implemented, companies struggle with managing the existing RPA systems and fail to exploit this technology's full potential. Therefore, unnecessary resources are used to manage the robots, reducing operational value creation. Furthermore, the orchestration of the robots is based on standard scheduling, making the digital workforce more unstable. Although, most of today's RPA tools manage to automate parts of a process but often struggle to automate it all (Lamberton, 2016). This means that only sub-processes are automated because of the lack of management of the robots.

RPA Supervisor (2021) propose that by implementing their supervisor, several of the barriers to upscaling the RPA environment disappears. They substantiate the claim that one of the barriers to implementing RPA is an unsatisfactory return on investment (ROI). In addition, many companies hold back from scaling because of development costs, time-consuming processes, and lack of competence (RPA Supervisor, 2021). Without a supervisor, these issues will keep the companies from upscaling, which means they will struggle with keeping up with the technological development and improve their processes. Furthermore, without managing, companies struggle to increase value as a large part of the process is not automated. Therefore, we see that several aspects of the digital workforce are not optimal.

From the theoretical foundation, we have that profitability is a function of benefits minus risks. This gives the following value for profitability without implementing the RPA Supervisor:

$$\pi \leq 0 \leftrightarrow \pi^{WRPAS} < \pi^{RPAS} \tag{8.3}$$

As expressed in the equation, the development in profitability is less than or equal to zero as no benefits will occur without an investment. However, no risks will be present either. The profitability will therefore not depend on either achieved benefits or risks.

The scenario with the RPA Supervisor represents today's actual situation. Ward et al. (2007b) argue that organizations do not meet their desired outcome when investing in IT. However, our results indicate the opposite as 80% have achieved all their expected benefits regardless of industry and company size. These findings may indicate that the customers' profitability has increased. Still, for this to be true, we must compare the benefits against the risks to conclude which of them possesses the greatest value.

8.1.1 Negative impacts on profitability

Our study finds that there are risks associated with implementing the RPA Supervisor. 30% of the risks mentioned are related to discrepancies in the performance of the software. Nevertheless, 23% worry about general errors in the software, while 20% find it risky to be dependent on a third party. Hence, we conduct a risk analysis to investigate the inhibitory effect of the risks on the companies' profitability. The risk analysis determines the risks' severity and the likelihood of occurring and is illustrated in the risk matrix below.

The analysis is based on the risks from our findings in chapter 7 as well as previous literature and studies. Table 8.1 shows the categorizations of the risks and the consequences that can arise from these risks occurring. The risks are numbered 1 to 6 and are used in the risk matrix below.

	Risks	**Consequences**
1	Lack of training	Unable to exploit the full value of the software as it is not used correctly.
2	Fail in infrastructure	Not able to complete operations as the automations are out of service.
3	Discrepancies in the performance of the software	Dissatisfaction with the software, not able to use it for the intended purpose.
4	Dependency on RPA Supervisor (as a third party)	Vulnerable if RPA Supervisor fails to deliver, so does the company.
5	General errors in the platform	Not able to complete all the tasks, and require more time spent on each process.
6	Bad user experience	Dissolve the contract with RPA Supervisor.

Table 8.1: The risks and consequences

The risk matrix is divided in three where the green area indicates low risk, the yellow shows moderate risk, and red signals a severe risk. Implementing the software will increase operational risk, i.e., both process and system risks will increase. However, human errors decrease as the RPA Supervisor automates the human tasks related to operational activities (RPA Supervisor, 2021). Therefore, the total operational risk is a trade-off between the increase in systems- and process risk and the decrease in human errors. Without the software, the danger of human error will be present as monitoring and scheduling of the robots is manually exercised. Therefore, the risk matrix indicates the severity of the operational risk. The assessment of the level of risk is based on the following formula provided by Lavanya and Malarvizhi (2008):

$$Level\ of\ risk = probability\ of\ risk\ occurring\ x\ risk\ impact \qquad (8.4)$$

We locate the risks in the yellow and green areas which indicates that they represent a tolerable but considerate risk for the companies. We have not assessed differences between industries and company size as the data does not provide sufficient insight.

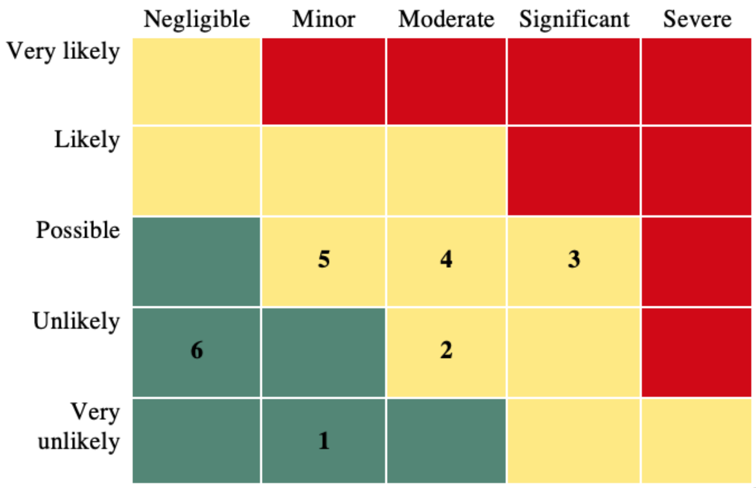

Figure 8.1: Risk matrix

"Lack of training" (1) represents a risk that the software will not achieve optimal performance because the customers do not know how to use it. This is a relatively common issue for IT investments, but since RPA Supervisor offers customer service, such issues can be quickly resolved. 7% are concerned this risk will occur, which supports our arguments that the risk is possible but will not pose a great danger for the customers.

"Failure in infrastructure" (2) represents the additional risk that follows a new software as it brings a new point of failure to the infrastructure. Since only 10% find this a potential risk associated with the implementation, we assume it is unlikely to happen. However, a failure in infrastructure may cause moderate complications for the users, leading to a halt in operation.

"Discrepancies in the performance of the software" (3), "Dependency on RPA Supervisor as a third-party" (4), and "General errors in the platform" (5) are the most frequently mentioned risks. “Discrepancies in the platform” was the most frequently answered risk as 30% of the respondents were concerned this might occur. We therefore classify this risk as significant.

“Dependency on RPA Supervisor (as a third-party)” (4) is a risk that can have profound effects, but the problems regarding (4) can be resolved. Since 20% responded that this risk is a concern, we see that the customers are worried about being dependent on a third party. However, RPA Supervisor has an excellent customer support department that outweighs some of the risk of dependency on another party. Hence, we define the consequence of the risk as moderate and possible to occur.

“General errors in the platform” (5) are often a present risk as there will always be a slight chance of errors occurring when using technology. Because 23% see this as a potential risk, we argue that this risk is possible to occur. However, the risk is minor as such an error will be easier to fix than a human error, which would be the alternative if the software was not implemented.

“Bad user experience” (6) can emerge for many reasons but is likely a result of a lack of understanding of the platform. It was one of the least mentioned risks with a 10% response rate. Increased knowledge about the software will reduce the bad user experience. All in all, we argue that this risk is negligible.

The risk analysis reflects our findings regarding respondents viewing the overall risk as low. We see that the probability for the risks to occur is relatively low, and the consequences are neither of great importance for the customers. Hence, based on this risk analysis, we can confidently state that implementing the RPA Supervisor entails a low operational risk for the companies. Since we do not have enough information regarding how large the different risks are, it is difficult to conclude the total value of the operational risk. However, based on the positive user experience shown in table 7.9, we can argue that the customers do not view the risks as very influential.

The data from Statistics Norway presented in chapter 6 have both common features and differences from our results. Similar to our findings regarding the implementation of the RPA Supervisor, “Lack of competence” is also a potential issue relating to the use of AI technology. The study showed that more than half of Norwegian companies consider this the biggest issue. However, our study showed the opposite, namely that “Lack of training” was one of the least mentioned risks with a response rate of only 7%. This supports the software being easy to use and does not require additional costs for software training. This in turn will affect profitability as the customers easily can use the software and thus take advantage of the benefits that arise quickly. However, it is important to note that 60% of the respondents are large companies, and over 90% of the large companies had established an RPA CoE. This may indicate that they already have much competence in using smart technology. Consequently, they do not have issues with "Lack of training".

The companies from the Statistics Norway study also had concerns regarding AI technology being "Incompatible with existing systems and software" and "High costs". On the contrary, our findings revealed that these issues are not as significant in the case of RPA Supervisor. This is based on previous argumentation regarding RPA Supervisor leading to a reduction in cost of ownership. In addition, one of the benefits mentioned by the respondents was "Cost reduction". However, this benefit was only mentioned by 4%, which may indicate that RPA Supervisor not necessarily leads to a reduction in costs, but still is cheap to implement. The risks associated with high costs can therefore not be said to be true for the customers of RPA Supervisor. One of the advantages regarding the RPA Supervisor lies in the software being implemented on top of existing infrastructure. This prevents the software from being incompatible with existing systems and software, which provides lower risks than other technologies.

Barriers to using AI technology	**Frequency (%)**
Lack of competence	58
Incompatible with existing systems	46
High costs	42

Table 8.2: Most common barriers for using AI technology

Source: Statistics Norway, 2021

The table shows the most significant barriers to using AI technology in the Norwegian market, gathered from figure 6.3. However, our discussion illuminates that these barriers do not apply to the implementation of the RPA Supervisor. Moreover, from the in-depth answers, we were also aware that the customers regard the impact of the undesirable outcomes as low due to customer service and stability in the software. The analysis of our findings and the comparison with Statistics Norway's study indicate that the RPA Supervisor is associated with fewer risks than similar technologies, supporting the claim that the risks are low.

8.1.2 Positive impacts on profitability

To examine how benefits affect profitability, we substantiate the variables presented in chapter 4 with our empirical findings from chapter 7. Our survey brought to light some additional benefits that also affect the customers' profitability. The empirical findings are included in the flowchart below and are represented by the green boxes.

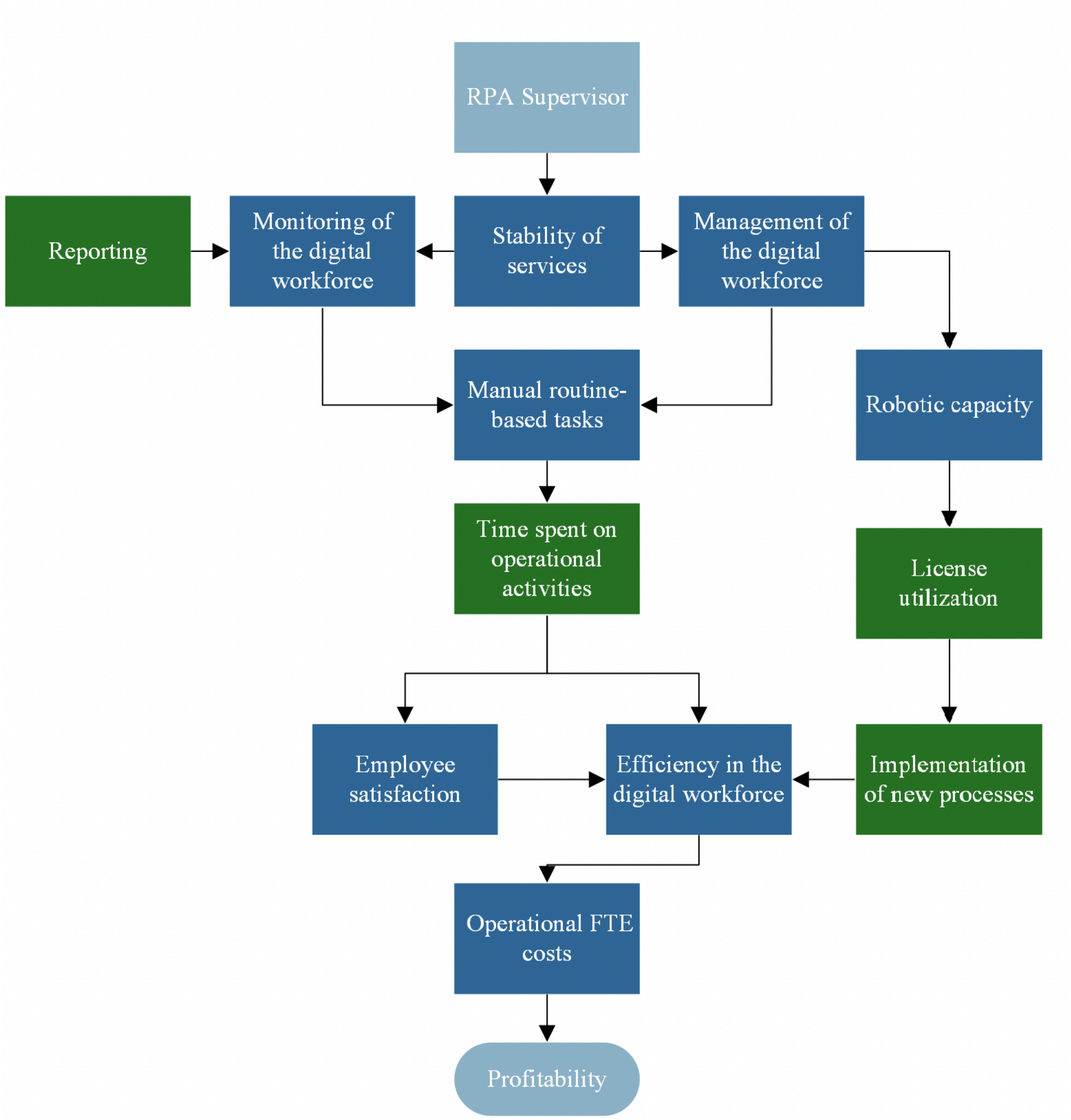

Figure 8.2: Extended flow-chart of the causal relationship between benefits

The chart reveals that our predetermined benefits from chapter 4 highly resemble what our study showed. We found that the customers realized the benefits we predicted and that there were a couple of new benefits to add to our chart. We do not find it very surprising that RPA Supervisor's customers expected similar benefits as we predicted since we based our anticipations on the company's recent market analysis. The green boxes show the benefits found through the structured interview, complementing the benefits extracted from the previous survey. Hence, the extended flow-chart represents the benefits' full effect on the profitability. However, as these causal relationships are based on the findings from our data collection it is important to clarify that there are other effects than our findings show that may influence profitability.

"Reporting" relates to the software improving the reporting and notification of processes, as well as giving better insight into data. This benefit makes the overall supervision of the digital workforce better and more user-friendly and thus influences the monitoring of the digital workforce. In other words, improved monitoring is a benefit that depends on improved reporting. The "Time spent on operational activities" will decrease from implementing the RPA Supervisor. The flowchart illustrates how this benefit is a result from many of the routine-based tasks now being automated. This in turn leads to freed human capacity which develops the profitability through spending more time on value-creating activities. Increasing "License utilization" means that each robot can perform more processes. This is due to increase in robotic capacity but is also a factor that affects how easily the "Implementation of new processes" can be conducted.

All these elements affect the profitability positively. The common denominator among these benefits is the operational focus. Furthermore, the achieved benefits indicate that the customers to a small extent focus on financial benefits. This is illustrated by the results revealing that the most crucial benefit from implementing the RPA Supervisor was "Improved performance of the digital workforce". This category accounted for almost a third of all the responded benefits. In general, we found that the most frequently answered benefits were regarding operational aspects of the digital workforce and benefits relating to financial aspects were rarely mentioned as previously shown.

The majority, 72%, of our respondents had also achieved at least one unexpected benefit. This proves that the potential for realizing benefits and increasing profitability often is greater than one had planned. This may argue that a benefit realization plan might be too rigid, especially when investing in lightweight IT as unexpected benefits may occur sporadically during the life cycle.

We furthermore categorized the benefits as being system-, user-, and business-dependent. This means they create value from the three dimensions by Cronk and Fitzgerald (1999). Previous literature argues that focusing on achieving business value instead of financial value is beneficial when investing in IT. Our discussion implies that RPA Supervisor's customers' have taken on such an appraisal approach as they have achieved their expected benefits.

RPA Supervisor is experiencing an increasing customer base, which amplifies the allegation that the customers consider that the benefits of implementing the software outweigh the risks and costs. In addition, the risk matrix indicates that the appointed system and process risks associated with the software are not of high severity as most of the issues can be solved through the support team. Finally, we see that the benefits have a major impact on profitability as the benefits augment one another. Compared to the risk matrix, the findings may imply that the benefits exceed the risks, which give us:

$$\pi > 0 \leftrightarrow \pi^{RPAS} > \pi^{WRPAS} \tag{8.5}$$

Although, we cannot argue that each benefit and risk's isolated impact on the profitability is equal from firm to firm. The implementation of the RPA Supervisor will most likely affect the profitability in different ways depending on, e.g., in which industry they operate, the company size, the RPA environment size, and how much RPA competency the firms possess. For instance, our findings indicate differences in which benefits were realized based on company size. Both the findings presented by Statistics Norway and our empirical findings show that large companies are most common to implement AI-driven technology and the RPA Supervisor. This may be due to greater resources and competence related to new technology or that large companies are more likely to have their own RPA CoE, as shown in chapter 7.1. In addition, table 7.4 shows that 30% of the large companies focus on "Improved performance of the digital workforce". Similar for small companies, the focus on achieving this benefit is significant. In contrast, medium sized companies focus more on "Less time spent on operational activities" and "Improved supervision of the schedule and the performance". This illustrates differences in the operational focus between the company sizes, consequently affecting profitability differently.

Our findings also showed significant variations regarding the size of the RPA environments. Therefore, we suggest that the profitability and the associated risks are different for small, medium, and large companies. It particularly differs between the size of the RPA environment. This can be explained by; the more RPA robots a company has, the more efficiency gains and higher profitability can be achieved through the implementation. However, an enlarged RPA environment also entails a higher risk that undesired outcomes occur, e.g., in the form of greater probability of error. To anticipate how different sizes of the RPA environment affect the benefits and risks, and hence the profitability, is therefore difficult. Although, for RPA Supervisor's customers, we can argue that the profitability will increase with an increased RPA environment.

The changing technological environment in the Norwegian market will also influence profitability. For instance, today only 6% of Norwegian companies uses technology to automate processes. However, as the use of AI technology has increased 4% from 2020 to 2021 (Statistics Norway, 2021), this supports the forecast that the RPA market will grow strongly in the upcoming years (Gartner, 2020). In combination with the rapid technological development, the customers will gain competitive advantages due to their early implementation of smart technology. Although this will not directly affect their profitability today, the profitability will have a positive development based on the predicted outlook. This is due to technological trends pushing companies to adopt technology such as the RPA Supervisor to ensure survival. Therefore, early adopters will be more efficient and thus more profitable in the long run.

8.2 Graphical presentation of development in profitability

The approach for our comparative analysis is illustrated in the figure below. The discussion reveals a gap between the situation with and without implementing the RPA Supervisor. This is due to the change in profitability shown as π. This model builds on the assumption that, $\pi^{RPAS} > \pi^{WRPAS}$, which indicates that the benefits exceed the risks. Furthermore, the figure emphasizes that a change needs to occur to achieve the desired profitability and it emphasizes that benefits are realized over time. Even though the implementation of the software cannot be defined as an organizational change of the infrastructure, it will still to some extent change processes. Implementing the RPA Supervisor may therefore be necessary to collect the desired benefits (Bradley, 2006; Karlsen, 2021).

The increased business value from implementing the software is shown in the green line and results from the change process. The figure illustrates our assumption that profitability is lower for companies that have not implemented the RPA Supervisor as they have not achieved the accompanying benefits. However, our model is theoretical, and our data do not give us information about how big this gap (π) is. In other words, our findings cannot prove that profitability for RPA Supervisor's customers is higher than for companies without the software. Thus, we cannot certainly state that the green line representing π^{RPAS} is higher than the red line representing π^{WRPAS}.

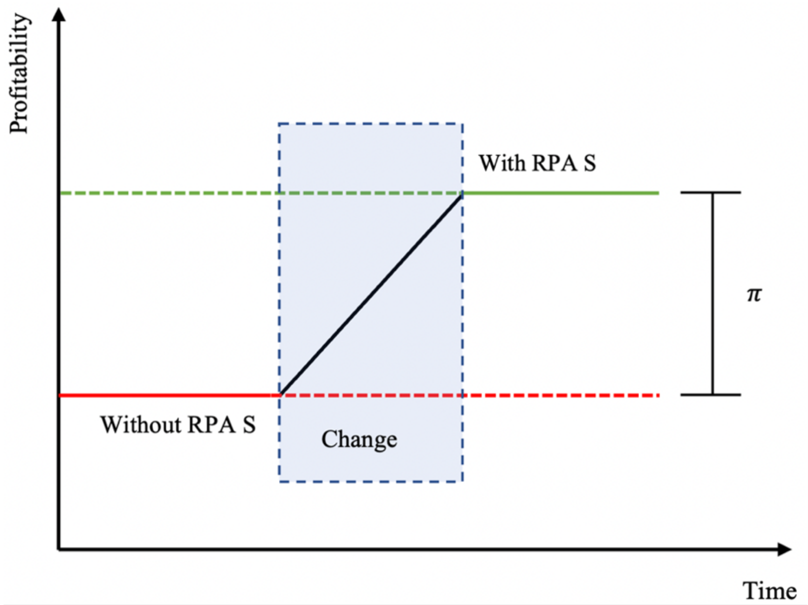

Figure 8.3: The profitability gap

Our discussion illuminates that the benefits of implementing the RPA Supervisor are considered as significant and the risks as minor. Therefore, we assume that the benefits exceed the risks and that the operational value creation increases from the implementation. This improved profitability can be explained as the ratio between the profitability with the RPA Supervisor and profitability without the RPA Supervisor. In research literature, this can be shown through the following equation (Grytten & Liland, 2021).

$$\partial\pi = \frac{\delta\pi^{RPAS}}{\delta\pi^{WRPAS}} = f\left(\frac{\delta k^{RPAS}}{\delta k^{WRPAS}}, \frac{\delta l^{RPAS}}{\delta l^{WRPAS}}, \frac{\delta m^{RPAS}}{\delta m^{WRPAS}}, \frac{\delta n^{RPAS}}{\delta n^{WRPAS}}, \frac{\delta o^{RPAS}}{\delta o^{WRPAS}}, \frac{\delta p^{RPAS}}{\delta p^{WRPAS}}, \frac{\delta q^{RPAS}}{\delta q^{WRPAS}}, \frac{\delta r^{RPAS}}{\delta r^{WRPAS}}, \frac{\delta R^{RPAS}}{\delta R^{WRPAS}}\right) \quad (8.6)$$

The equation shows that as long as the change in the parameters with the implementation is more significant than the change in the parameters without the implementation, the change in profitability will be positive.

From equation (8.6), we see that a marginal change (∂) in profitability depends on a marginal change (δ) in one of the parameters. Moreover, figure 6.1 shows that small changes in profitability can cause large fluctuations over time. Hence, small changes in benefits and risks will significantly impact the companies' profitability in a long-term perspective. We believe this is the case for RPA Supervisors customers since the benefits amplify each other (figure 8.2). Since 80% have experienced achieving their expected benefits, the marginal changes presumably give a positive slope in figure 8.3, which leads to a positive change in profitability.

However, this is an assumption based on the causal relationship between the parameters and the profitability, as well as the outcome of the risk analysis. We still see that the supposition for marginal changes within the parameters causing changes in profitability is consistent with the historical development of profitability in Norwegian companies. This is despite the fact that our analysis examines the business value and not the companies' performance measures. The historical development shows that the average change in ROA accounts for 0,02%, which is a marginal amendment in return on total capital. However, over the ten years provided in figure 6.1, this gives an overall extensive development in profitability.

8.3 Implementing the RPA Supervisor in light of BRM

Since our view on profitability is based on business value, we find it highly relevant to examine our findings in light of BRM to shed light on the possible links between our results and previous research. This helps elaborate on why our findings show what they do and make our conclusion more certain.

We have previously presented that organizations struggle to extract benefits from IT investments. Existing literature also argues that the solution for realizing benefits from IT investments is implementing benefit realization management as a proactive framework for all planned projects (Karlsen, 2008). However, our empirical findings show that 60% of the respondents who used a BRM plan and 78% who did not use a BRM plan achieved all their expected benefits. In other words, most of the companies have achieved the expected benefits without using benefit realization management. Nevertheless, the findings show that 53% of the customers do not think more benefits would be achieved by using a benefit realization plan during the implementation of the RPA Supervisor. Subsequently, we try to investigate the possible reasons for this outcome.

Implementing the RPA Supervisor is a relatively small IT investment. It is a software installed on top of the existing infrastructure. Our findings showed that the customers found the implementation easy to moderate, which indicates that it does not require major transformations. This also coincides with the definition of lightweight IT (Bygstad, 2016). Benefits realization management is designed for IS/IT, and it may be discussed whether such a framework fits the lightweight IT. An investment in the RPA Supervisor differs from other automation projects as it has a short implementation cycle, low investment costs, does not disturb the existing infrastructure, and is highly scalable (RPA Supervisor, 2021). Therefore, it will require less planning, mainly since many benefits occur during the life cycle. This implies that such investment allows for a more experimental approach and achieves benefits faster than other IT projects, which further emphasizes that the need for BRM is lower.

Even though the implementation does not require an organizational change, our findings show that 80% of the customers have established an RPA CoE in their organization. Organizing an RPA CoE can help the company achieve its goals, i.e., their desired benefits, and add value to the company. Therefore, establishing an RPA CoE may explain why the companies achieved benefits. Still, it is not a necessity, and what is most important is to have an operating model that supports the activities that lead to achieving benefits.

A possible reason why a BRM process might not be necessary in this context is that most of the benefits are tangible and easy to measure as they relate to the operations. The efficiency gains from the implementation can instead be measured by KPI's, i.e., license utilization or time spent on each process, which are measures that can be continually revised. The customers are also aware of which benefits are associated with the implementation before investing. It is, therefore, not an absence of a realistic picture of potential future outputs (Karlsen, 2008). This facilitates the customers to take on a broader perspective on the possible benefits of the implementation and not merely focus on financial gains. Our findings support this allegation as they have focused almost on all kinds of expected benefits. This contradicts previous studies showing that there is little explicit focus on benefits delivery (Ashurst & Doherty, 2003) and that there are shortcomings of IT management to demonstrate business benefits (Karlsen, 2008).

This discussion summarizes that the reason why the companies have not used BRM when implementing the RPA Supervisor is twofold. First, it results from the software being a lightweight IT that is easy to implement. Second, the companies already seem to be focused on benefits. A complete BRM framework might be too comprehensive and unnecessarily resource intensive, and to keep a focus and awareness on benefit realization is probably adequate. Therefore, we can argue that a broader focus on non-financial benefits leads to a higher share of realized benefits than focusing on financial key figures such as ROI and ROA.

9. Conclusions

This thesis aimed to answer the problem: *"How has the profitability of established companies developed due to implementing the RPA Supervisor?".* To answer this question, we initiated by investigating existing literature on IT investments and the lack of value creation. IT has been known for creating competitive advantages for businesses and is therefore seen as an important factor to sustain competitiveness in today's turbulent environment. However, the literature argues that most IT projects fail to deliver value due to a lack of focus on improving business value.

Theory regarding lightweight IT projects as well as BRM was introduced. Furthermore, the theoretical foundation presented factors influencing profitability through a mathematical model explaining that a marginal change in the parameters leads to a change in profitability. Therefore, this theoretical foundation worked as a basis for the analysis of the development in profitability.

We found a descriptive and combined qualitative and quantitative approach suitable, and the data were collected through a structured interview. The data analysis is based on a content analysis which enabled us to study qualitative data by coding and categorizing the answers quantitatively. Moreover, the empirical findings were examined through descriptive statistics to highlight the most interesting and prominent results. The descriptive statistics analysis is based on both a univariate and bivariate analysis.

Through a comparative analysis, we discussed the development of the companies' profitability in terms of benefits and risks. The development in profitability has been viewed in light of the development in profitability for Norwegian companies from 2010 to 2020. Nevertheless, the empirical findings were substantiated with technological trends in the Norwegian market to examine the drivers and barriers within technology implementation.

The analysis indicated that there had been a development in the profitability of RPA Supervisor's customers resulting from the software implementation. It revealed that the implementation provides benefits such as improved supervision and performance of the digital workforce. Moreover, the biggest risks were discrepancies in performance and general errors. Furthermore, the comparative analysis shows various benefits that create value by themselves as well as positive synergy effects in different parts of the business value. However, the benefits' positive impact on the profitability is admittedly reduced by the risks of adverse outcomes. Nevertheless, our comparative analysis exposed that the risks associated with the RPA Supervisor are lower than the risks for other AI technology in the Norwegian market.

Our study uncovered that the absence of value creation is not as present for implementing a lightweight IT such as the RPA Supervisor, as previous research shows. Still, we cannot conclude how much the profitability has developed based on our data. However, we argue that a marginal change in a benefit or risk will significantly affect profitability. Nevertheless, we can assume that implementing the RPA Supervisor provides sustainable competitive advantages that lead to long-term profitability as their customers have achieved significant benefits. In addition, we find that the software's associated risks are regarded as low.

9.1 No need for a BRM framework

This thesis also discovered that a BRM framework is not crucial for success with investments in lightweight IT. The rationale behind this statement is that the RPA Supervisor is an easy-to-use technology that generates benefits throughout the life cycle of the software. Furthermore, the lightweight software can be implemented quickly and with low investment costs. Therefore, it is not a prerequisite to plan for expected benefits or spend significant resources on this in isolation as there is room for a more experimental approach. Our findings indicate that most expected benefits are achieved when investing in lightweight IT. Since no significant transformations are required to succeed, a BRM framework such as the Cranfield model is not necessary for realizing planned benefits. In addition, the sporadic achievement of unexpected benefits indicates that a more dynamic approach will be suitable for lightweight IT.

To achieve expected benefits from IT projects, companies should focus on increasing their business value instead of focusing on financial metrics such as ROI and ROA. This is due to IT investments not necessarily leading to higher returns on capital but increasing the total business value. Therefore, measuring profitability according to such metrics could give inaccurate estimates. In addition, as most of the achieved benefits are tangible and easy to measure, simpler indicators can be used to achieve the desired outcome. However, it will be advantageous to plan which benefits are expected to be achieved through such an investment. Nevertheless, the method should be somewhat simplified than in the case of heavyweight IT.

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Appendix 1: Categorisation of benefits

Merged benefits	**Benefits**
Less time spent on operational activities	• Less time on managing schedules or RPA processes • Less time in maintaining processes and infrastructure • Less time spent on operational activities • Less time spent on controlling • Saves time • Better time management • Process priority management • Simplifying operation • Giving time/hours back to the business to spend on more critical or valuable tasks • Significant reduction in average time spent on completing a task
More efficient implementation of new processes	• Quicker to on-board new processes in production • Easier to implement new processes • New possibilities have created new needs and ideas which has led to unlocking the full capabilities of RPA • Able to expand the use of RPA to other areas more easily • Reduced need to have non-developer users with access to Blue Prism?
Improved supervision of the schedule and the performance	• Better insight into processes • Better overview of schedule • Easier to monitor performance • Better overview of the environment and performance • Better looking control room • Better visualization of time saved • Quicker visualization of how many cases the robot has run • Better control • More accurate information about failing in processes • Supervision • Better monitoring of all the robotic activities • Easy to monitor BluePrism machines • Users can monitor their process • Less supervision • Dashboard • Information from dashboards • Clear view in license utilization

Increased license utilization	• Better license utilization • Higher license utilization • Better license utilization • Better utilization of licenses • Saved licenses • Improved license sharing between processes • Reduced license usage • Better use of licenses • Much better BP license utilization • Better utilization of licenses
Easier and more intelligent scheduling of processes	• Easier process scheduling • Easier scheduling • Easier and smarter SLA-based scheduling • Better scheduling of processes • Easier scheduling • Flexible, intelligent scheduling of processes • Better administration of processes • Improved scheduling of robots • Much better scheduling through SLA definition • Ease of schedule management • Pooling of credentials for processes • Easier to schedule downtimes than expected • Improvements of the standard for scheduling • Time change was made easier
Improved reporting of performance	• Improved reporting of processes • Improved notifications on processes • Insight into data • Possibility to give access to other employees who want to monitor the progress of the RPA-processes • Better process architecture with its improved triggers and workflows • Better communication with IT? • Better reporting back to business
Improved performance of the digital workforce	• Less downtime • Easier to handle • Improved platform stability • Reduction in “unneeded” runs due to intelligent triggering • Better SLA handling during peak hours • Quicker response time on processes • More options for handling frequency • Easier to do maintenance

	• Improve business SLA of robotic • Reduce control room activities • Able to set the machine to planned downtime • More stable production environment • Good dashboard capability • Ease of triggering the bots • More dynamic switching between processes • Enhancing bots' orchestration • Reduction of data entry errors, improved data quality • Automatic restarting of robots • More options to handling how long each process runs • Ability to use downtimes, did not have to shorten working hours • Higher responsiveness of the RPA process • More stability • Much better ability to handle downtimes • Easier to pause servers and processes (planned downtime) • Ability to defer a task to pending and run it as soon as the machine is available • Reduced data entry errors
Employee satisfaction	• More pleased process owners • Greater end-user satisfaction
Cost reduction	• Cost reduction through license utilization • Dollar value associated with time savings to put back to the companies' bottom line • Efficient resource management • Resource pooling is much easier

Appendix 2: Categorisation of risks

Merged risks	**Risks**
Lack of training	• If they don't learn the software correctly, the implementation will not be a success • Lack of competence
Increased possibility that infrastructure fails	• Required additional infrastructure, could require more to maintain • Implementation has created a new single point of failure to the infrastructure • Possible outages due to a third-party tool interacting with BluePrism
Discrepancies in the performance of the software	• The functionality would not work as expected causing us to spend additional resources • Cost/benefit • Product not executing RPA processes, forced to manually run them • Lack of customization • Double workload with controlling everything in the control room in addition to RPAS due to not trusting the results in RPAS • Loos the control of processes if RPA does not work • Security • Not making all processes work optimal • RPA process redesign in case of RPA processes with no split in load queue and process queue logic
Dependency on RPA Supervisor (as a third-party)	• Supplier dependency • Supplier dependency • Increased caution when upgrading BluePrism • A third-party software that also requires maintenance. • If RPAS goes down everything stops. • If they do not adapt themselves with changing BP versions, it is hard to upgrade
General errors in the platform	• Concerns that the developers would not be able to properly identify if an add to queue-process had created items as it should • Glitches in software • Technical issues due to problems with the application server • Issues due to latency in the network • Software bugs causing RPA processes to run unexpectedly • Pushing the software beyond its limits • The holiday/non-working day system had several issues such that the client was unable to use it properly for some time
Bad user experience	• Difficult to ensure correct setup in user management • Lack of feedback to the user when they make mistakes • Manual configuration of tasks and workflows that cause processes not to run at scheduled times