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TOWARDS SME GROWTH: RPA AS AN INTERVENTION TECHNOLOGY IN ACTION DESIGN RESEARCH

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Research In Progress Paper

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Abstract

Small to medium enterprises are in a constant battle of stabilising internal support and development processes vs their external growth potential. Identifying fitting technologies that can support this stabilisation while still enabling scalable growth is a difficult challenge, especially for practitioners who want to maximise productivity rather than getting in a perpetual state of learning and developing new technologies. In this study we use action design research to establish two robotic process automation interventions in an SME to identify the technological design features that technology interventions should have to establish stabilised and balanced internal and external growth processes. In this Research-In-Progress we work in close cooperation with the firm Lindgaard Pedersen to attempt implementing RPAs in their business to explore different design features that can help establish a proper implementation of RPA in a small to medium enterprise setting[1].

Keywords: Intelligent Automation, Robotic Process Automation (RPA), Small to Medium Enterprises, Action Design Research, Business Growth, Organisational Development.

1 Introduction

Small to Medium Enterprises (SMEs) will in their infant years often struggle with maintaining a balance between selling products and getting new customers while maintaining internal processual stability (Greiner, 1997). Too much growth and they will crumble because of a lack of resources, too much focus on internal processes and no growth will be made at all. The paradox is referred to as the balance between *exploitation and exploration* (Werder & Heckmann, 2019) and indicates a need for finding a way to survive while growing new customers or products. Sometimes the solution can be a technological solution where the implementation of an information system (IS) helps manage the exploitation side of the organisation. Sometimes the solution can be found in organisational learning where the employees reflect on, review, and improve their internal processes. However, a balance is still needed as the scale of an IS needs to be learned and utilised and organisational interventions need to allow for time and resources for the core business processes (Sándor & Gubán, 2022).

In recent years, robotic process automation (RPA) has been touted to offer up technical solutions that free up valuable human time in organisations by freeing up laborious and menial tasks (Leopold, van Der Aa, & Reijers, 2018) (and not, as many have feared, increased the risks of robot uprisings (Davenport & Ronanki, 2018). Because RPAs interact with systems as a human would, it is quite formidable for performing tedious tasks, as it can work independently without requiring the robot to be directly integrated with previous systems. As such, RPA can be quite a necessary band aid as it may

[1] This paper is based on a master thesis published in June 2022.

bridge larger, complex IS with little or no integration features. In short, what a human can do, an RPA tool can accomplish much more effectively and efficiently. Drawbacks include the fact that RPA requires intensive mapping of manual work processes (Enríquez, Jiménez-Ramírez, Domínguez-Mayo, & García-García, 2020) cost benefit analyses that require employee motivation and onboarding, as well as a high level of upkeep for complicated automation (Villar & Khan, 2021).

An important distinction in terms of the existing research context of RPA, though, is that the benefits and pitfalls of RPA mostly have taken place with larger companies (Enríquez et al., 2020). While it certainly can be argued that the same challenges and opportunities may be present for smaller companies, there is a central distinction. With very few resources, RPA tools can be set up to standardise and automate these internal processes while maintaining the external growth. For SMEs the number of systems in use is furthermore not so large that the identification, analysis, and assessments, and most importantly, maintenance of operations, are impossible to handle. It does beg the question whether SMEs will ever attain the economies of scale that, say, a large company may experience by executing a task 1000 times a day but maybe this is not the point for SMEs? Economies of scale are all relative, meaning that a minor 20-person company that experiences an automation of 20 processes a day potentially could experience the same benefits as a larger company when adjusted for size.

In this study we explore the research question: "*How to design digitalisation tools for SMEs that reinforce organisational self-propulsion of business-oriented and technical analysis?*"

The study is a case study of an implementation process that took place in the Danish company Lindgaard Pedersen A/S; an SME with 12 full-time employees and an annual gross profit around 10 million DKK. Lindgaard Pedersen is located in Roskilde and specializes in aftermarket implementation of additional equipment for automobiles. The paper is structured the following way. First, we synthesise the existing literature on RPA cases and the literature on SME IT architecture to identify potential overlap and significant areas of knowledge. Next, we establish our method of action design research that explains the cycles of the empirical data collection, identification of the main problem and solution potential. We then introduce our case and our main findings of the evaluation of the artefact design as the main interventions. We finally discuss our findings in terms of how the results contribute to existing knowledge on what helps SME grow by using action design research and RPA as our main contribution. We then conclude our findings and how to progress and develop our nascent design theory further.

2 Previous literature

In the following we first present the elements of SMEs and how technological and business-oriented growth can be supported by digitalisation. We then use these findings to identify which features of RPA could support SMEs in their journey towards growth.

2.1 SME growth

Companies grow when their products and services are needed. Since the early 1970s, models on how SMEs develop growth have been proposed known as lifecycle models or phase models. For example, Greiner (1997) notes that growth in companies can be viewed as evolutionary phases with predictable and measurable growth or revolutionary phases where different crises occur, most notably in five overall phases depending on the maturity and size of the organisation. Most recently, these phase models have been criticised for being too linear as SMEs, even the smallest ones, have various tasks, types of employees as well as customer segments and types of products, leading to growth and potential taking place asymmetrically (Sándor & Gubán, 2022). With the onset and prospects of digital services and products, 'growth' is difficult to operationalise due to the variability and diversity of markets.

2.2 Robotic Process Automation Features

The RPA tool works by being developed to automate one or more processes within a digital system, theses process is often time consuming and not difficult to complete. An RPA that has been developed and implemented into a digital system will interact with the system as if it were taking over the human employee's task, using the same resources (Leopold et al., 2018).

RPA has grown in popularity over the last decade (Willcocks, Lacity, & Craig, 2015). One example is that of the Systematic Mapping Study that focused on comparing more than 45 other RPA implementation studies (Enríquez et al., 2020). The study found that most successful RPA cases tended to divide the implementation process into several phases of analysis, design, construction, deployment, control and monitor, and evaluate and performance. Although the phases are quite similar in essence to that of Information Systems Development, their main difference is the interaction of reflection and evaluation which allows the focus helping the employees understand how the development process works (Enríquez et al., 2020).

Several providers have already emerged on the market due to the high demand for RPA; each with their own strengths. By analysing processes that will be automated with RPA, we can decide which feathered automation will be most beneficial (Ghouse & Sipos, 2022). RPA tools can be divided into two types depending on its functions and the task it is automating. In order to qualify for inclusion in one of these sections, an RPA must either be capable of functioning on its own without human interaction, or be developed so that it requires human supervision to function efficiently (Syed et al., 2020):

- *Unattended* RPA can be left alone and there won't be any need for human hands to watch it complete the tasks. This means user interaction between RPA and humans is not necessary. This leaves the construction of an unattended RPA with less margin for errors through interaction.
- *Attended* RPA is built to work alongside humans in a collaborative environment that needs human supervision to start its tasks as well as complete it. By using attended mode, individuals can trigger bots to perform parts of a process that require interaction and monitor those activities.

RPA activities have shown to be able to deliver an improvement of 10–20% use cases such as payment changes and fund transfers (Syed et al., 2020). Attended RPA allows tasks that require human intervention to have some of the operations be automated, while other parts of the task, such as creating financial reports will be left in human hands. This hands-on RPA also means the employee can delay the RPA task and make any required changes to the process. Attended automation is often used in call centres and hospitals where human assessment is necessary (Syed et al., 2020).

3 Research Design and Method

Our overall research design is that of a single case study used combined with Action Design Research (ADR) (Sein, Henfridsson, Purao, Rossi, & Lindgren, 2011). Case studies are useful when asking "how" and "why" research questions (Rowley, 2002) and selecting a single case allows for going into depth with the possibilities of the problem and solution space. As such, it fits well with the overall purpose of ADR that specifically lets the design of an artefact from the specific needs of an organisation to build knowledge about classes design problems and solutions. Other choices of research methods could have included canonical action research (Baskerville & Wood-Harper, 1996), Design Science Research (Hevner, March, Park, & Ram, 2008) to name a few. However, the dual focus on both organisational context and technology artefact was very fitting for the research question and ADR in general. During the development of the project, ADR was used as a tool to gather information as well as plan out the course of action for the various parts of the project that was to be implemented. When using ADR the purpose is to create prescriptive design knowledge, by constructing and evaluating IT artefacts created within an organisational environment. With ADR methodology, one can focus on creating, modifying, and evaluating a researched artefact that reveal both the theoretical foundations and the influence of

users (Sein et al., 2011). Following the principles of ADR, we divided the RPA implementation into four stages to better address the implementation issues and the overall research question.

The research team (henceforth "RPA team") consisted of three Computer Science master students who identified, developed and implement RPA in a SME. One of the students worked for the company part time while the others were external. The RPA Team involved the employees in the development and implementation of the RPA process, which made the team focused on designing specialised solutions for the employees and their work environment. At the time of writing Lindgaard Pedersen has 12 employees including the CEO of the company, Henrik Haven. These employees have varying work assignments ranging from finance, development and shipping of the product.

3.1 Stage 1: Problem Formulation

During this phase it is important for the RPA team to identify and conceptualise the research opportunity based on the known theories already established (Sein et al., 2011). During the initial process a presentation and a RPA workshop were held early in the process of implementing RPA at Lindgaard Pedersen in order to involve the employees as early as possible. As part of the presentation, they were introduced to RPA as a concept and how implementing it would benefit them. By the end of the presentations, the employee would follow up with a request list of tasks they think could be automated.

To build the most beneficial RPA for the company the process on the request list had to align with the short- and long-term goals of the company. This goal was determined by talking with the employees at the firm as well as having a thorough dialogue with the CEO of the firm, who shared his views on RPA and what it could bring to the company if implemented correctly. The RPA team wanted to find the best process within Lindgaard Pedersen to automate with RPA, therefore the tasks that the employees wished to automate had to be ranked. This was so it was possible to prioritise the highest value assignments and know where the largest opportunities for successful RPA creation was, thereby the design research was problem inspired, by the problem these processes entailed. A significant amount of potential can be lost by automating the wrong processes, and further reduce profitability (Fersht & Slaby, 2012).

The RPA team was set up as the researchers and RPA developer while selected employees were the practitioners. As the RPA team only had limited time working on the implementation, it was vitally important the process reinforced the self-propulsion of further successful RPA processes within the company. Therefore, following ARD principles the RPA team focuses on generating knowledge, the company could use to solve problems related to RPA solutions, instead of only focusing on the RPA development itself. Of the list of processes that could be automated by RPA, created by the employees, it was estimated the RPA team only had time to focus on building two RPA cases. This stage seemed to have a great effect on the employees, as a lot of questions were asked and the general level of activity after the workshop was high. This could point towards introducing the employees to workshops could yield a positive result towards implementation of RPA in the company.

3.2 Stage 2: Building, Intervention, and Evaluation

In stage 2 the RPA team focused on the problem framing that was set up by the employee's automation list, to use as a premise to provide a platform for generating the initial design of the RPA artefact (Sein et al., 2011). As Building of the IT artefact (BIE) is with the technology of RPA its IT-Dominated. When the RPA team started building the two selected cases, we conducted several interviews and presentations along the way for the company to take part in, to figure out exactly what they wanted out of RPA technology and what they valued the most, this helped better secure a long-term commitment from the employees of the company. It also allowed early designs to work as alpha versions of the RPA processes, that the employees as practitioners could test out. This gives valuable feedback to the RPA team that could be used to evaluate the two RPA cases. Then the RPA team repeated the cycle and went back to using it to evaluate the further build of the RPA cases. After further building on the artefact, it becomes more of a beta version instead of an alpha. This allowed the RPA team to test both cases in the users'

environment and make further evaluation on the artefact. This step within ADR is important as it helps refine the artefact as it is created and reformed by the use context (Sein et al., 2011). After receiving the next round of feedback, the team used them to make the final adjustment to the artefact before they were complete and ready to be fully deployed in a live environment (see Figure 1).

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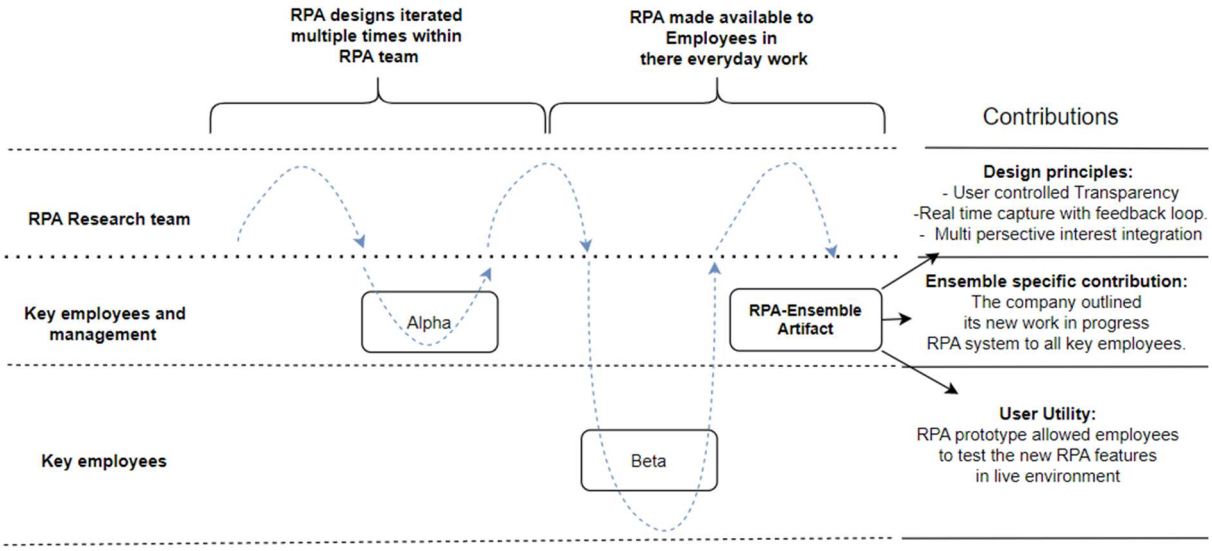

Figure 1. IT-Dominant BIE in the RPA project at Lindgaard Pedersen

3.3 Stage 3: Reflection and Learning

Stage 3 focuses on making sure the experience gained from the building solutions expand from being a locale instance to be adjusted on a larger scale (Sein et al., 2011). The reflections on the evaluations and development cycles gave a better understanding of the given cases, as well as an understanding on how these experiences could possibly lead to the advancement of further RPA development. In this stage the RPA team noted that there were several problems when the RPA had to be implemented in the live environment. The RPA artefact could only be run on the device it was originally developed, and there were problems sending the RPA package to the secure system administration server where it had to be run. This meant that the RPA artefact had to be refined to fit the new device. The company and the RPA team used this knowledge when they had to revise other RPA design principles which would also have to be sent to the administration system. The company has since then been planning to initiate a new RPA project focused on implementing RPA into their handicap features through their webpage.

3.4 Stage 4: Formalisation of Learning

In the final Stage ADR focuses on formalising the learning points gained from the artefact building cycle and being expanded into general solution ideas for class of field problems (Sein et al., 2011). Thereby the RPA team as researchers should outline the achievements and outcomes by the RPA artefacts by building and formulate learning. With the two RPA artefacts, they needed to access two old systems that led to many errors and refinement, the team managed to adapt to the challenges and complete the RPA development. As the company has many older systems, which are a challenge for RPA to access, formalising the knowledge of how to access these older systems, can give way for new RPA development. The same can be said with the use of RPA user interaction, which leads to the need for additional security measurements, as well as error notifications for the user involved. By using the ADR principles, we ensembled specific knowledge that contributed to insight into a new RPA project, one of them focused on implementing RPA into their accessibility features through their webpage.

4 Case Results: Adoption of RPA in Lindgaard Pedersen

Lindgaard Pedersen has multiple collaborating contacts with other companies, which means their market is expanded to a wide range of customers around the world. To complete this high demand, Lindgaard Pedersen was interested in trying to automate some of their repetitive processes to relieve some of their employees of these tasks. As a result, Lindgaard Pedersen recently invested in RPA to increase efficiency, reduce costs, and improve both the customer experience and employees job satisfaction. As part of the implementation Lindgaard Pedersen created an RPA development and implementation team that worked closely with the employees who were going to be affected by the RPAs.

4.1 Requirement analysis and grading of tasks

Based on the result of the Grading model, the requested process would be divided into a category and graded by a set of criteria on how well it benefits the company. The different tasks were rated and shown to the employees for feedback (see Table 1). The factors were determined by talking with the employees at the firm as well as having a thorough dialogue with the CEO who shared his views on RPA and what it could bring to the company if implemented correctly. We identified the following criteria:

Time savings: The amount of time that employee(s) save by having the process done with the help of automation, instead of having to do it manually.

Environment stability: As RPAs need very specific instructions to do their commands properly, it's important that the environment that the RPAs operate in are not under changes too often. Some RPAs can adapt to smaller changes in the program that they are operating in, but larger changes can result in the RPAs to become ineffective or not working at all. The less often that the programs are being changed, the greater are the chances of the RPA to work as intended.

Money Saved: Some processes require less funds after implementation of RPA, as parts of the process can be excluded or be made cheaper with RPAs.

High Volume: Some processes may require a significant number of resources, and even if these processes are not often repeated, they can unleash a high potential value for the company if automated. Automating tasks with a high volume, but low value, or those with a low value but high business-criticality can also be advantageous. A possible example would be the automated handling of certain customer transactions during holidays, which would eliminate the need for human work on holidays while also providing 24/7 service availability.

Programmability

Whether it is possible for the tools that are currently being used to make the desired program that can help in automation. As RPAs have natural limitations, some processes are simply not made to be programmed or become too difficult to make efficient with automation, whereas manually doing the task simply makes more sense.

	Time savings (1 - 5)	**Environ-ment stability (1 - 5)**	**Money Saved (1-5)**	**High Volume (1-5)**	**Progra-mability (1-5)**	**Total points**
Updating of inventory and economy system	4	5	4	5	5	23
Search licence registration plate database to acquire type of car	4	4	3	2	2	15
Sending files to bank account	3	5	3	4	2	17

Updating automatic email system	Unable to define this	5	?	1	4	10 (uncertain due to time saved)

Table 1. Table of the criteria and the tasks of the employees

4.2 Results of Task Model

The two tasks that scored the highest in potential were selected as cases:

Case 1: Torben works in the inventory department. Before he leaves, he updates the stock of the inventory for the day. Torben must use two different programs to update the inventory: Microsoft Access and C5. Following the launch of Microsoft Access, Torben opens the inventory of the day and orders the update for the current day. The update is then sent from Microsoft Access to C5. This is then printed so that a paper copy of the updated list can be kept for record keeping purposes. On the same computer that was previously used, Torben enters C5 through a virtual machine. Once Torben writes his credentials, he has access to C5, where he must fill out the online bookkeeping for the day's inventory. Torben first creates a temporary file in which the updated file from Microsoft access will be stored. He then orders an update of the inventory, uploads the file and updates their inventory. Then another physical copy is printed out and the file is moved into a bookkeeping folder to be signed.

Case 2: Almost daily, Mette, the chief of finance, must submit to the bank an "OIO" file. To log into the banking system, Mette needs a six-digit code that she receives from the bank through a physical piece of hardware. The code is then used to access the banking system, and from there, Mette must gain access to the correct folder, locate the file, and upload it to the bank's system.

5 Evaluation of the RPA case implementations

After the implementation of the unattended RPA, the whole process was re-evaluated. The RPA team agreed with the inventory manager that changes needed to be made to the system in general. With case 1, the project team discovered that this RPA was able to reduce employees' time by 5-10 minutes per day, which is not a lot, but if taken into account the first developed RPA saves 1125 minutes per year (5 minutes * 225 working days each year). With case 2, the project team discovered that this RPA would be able to reduce employees' time by 7-12 minutes 3-4 times a week. Each year = 225 days / 5 = 45 working days, such as 45 Mondays. 225 - 90 = 135. This could save the company and the employees at least 945 minutes per year (7 minutes * 135 3- 4 working days each year).

Interestingly enough, the RPA´s influences and learning points were far deeper than simple saving the company a few minutes a day, as the RPA have peaked the interested in Robot Process Automation. Based on implementations of RPA in their workdays, we found that the employees were content with their employment and are not afraid of being parted with, which helped with the implementation and problem finding process of the project. While creating the unattended RPA in collaboration with the manager of inventory, the following statement was given: *"It would indeed be great to not having to update the inventory every day, and also having the printed files printed in the morning so that I could focus on doing other things" (Torben, Head of inventory, Interview 1).*

In fact, one of the most import findings was that the RPA implementation removed daily obstacles that created motivation for working in different ways and on new tasks in the long run. One example was the RPA that was developed for Torben where he no longer had to remember updating the inventory and print the results in order to ensure proper recording. It led to easier and more consistent updating of the inventory at Lindgaard Pedersen: "*Sometimes updating of the inventory has been forgotten, meaning that the inventory will first be updated the next day." (Henrik, CEO, Interview 2).*

The impact on the overall mindset also reached the CEO who became motivated to develop RPAs on his own during and after the formal RPA implementation. He was to follow the same methods that was shown: *"I have also started work on my own RPAs in the interest of the firm. With the tools and know how, have made it possible for me to develop these RPAs on my own" (Henrik, CEO, Interview 2)*

During our time at Lindgaard Pedersen, the CEO managed to create smaller RPAs that could solve simple tasks for him on his own. This meant that the CEO was interested enough in this technology to work on it without our consultation. The CEO also helped with setting up the RPAs that we were implementing, by providing insight into the processes of the company and how the tasks that were to be automatised usually were handled by the employees. This meant that the implementation of our RPA put ideas into motion that led to an optimization of a process that had been overlooked. This was further emphasised by the CEO who shared his ideas for the future of RPA in his company: *"We are currently expanding in collaboration with Auto Max, which means that we require a new website. We have already considered how and if the use of RPA could be beneficial for the website" (Henrik, CEO, Interview 2)*

It also meant that the initial RPA test resulted in a further "RPA mindset" in their work, as the employees saw the potential and benefits. Our implementation process was an excellent example of an implementation process that they could hereafter do on their own. We also asked the head of inventory about what his thoughts were about RPA in general after our implementation process and he noted that: *"It seems like it has a lot of good features and is easy to maintain. Surely, it'll have potential if investments are made into it" (Torben, Head of Inventory, interview 1).*

6 Discussion and Conclusion

Our preliminary findings of this study propose that it seems that technologies like RPA can be viewed as useful digitalisation tools for reinforcing business- and technological growth. RPA is a technology that works well in SMEs to solve immediate tasks that consume time and otherwise hinder employees in reflecting and doing organisational growth work. The features of RPA that enable this were found to be: task identification, dependency analysis, potential to free up time, ease of learning and maintenance that enable a higher knowledge and scope of the field that employees. ADR is a method that balances both technological and organisational impact and influence on the motivation for both learning about the organisation and its technology. With the aid of Action Research, the development process was easily navigated. With Action Research as a planning tool, the team was able to perform multiple cycles of the Action Design Research Cycle to streamline the development process and learn from previous mistakes. The result was a product that was ready for implementation and use by the company. Thus, it can be concluded that the Action Research Cycle helped the project team navigate the project and therefore was essential to the successful implementation. With respect to previous RPA literature, one interesting aspect was that our results encountered none of classic risks of RPA such as intensive mapping of manual work processes (Enríquez et al., 2020), or a need for employee motivation and onboarding, and the high level of upkeep for complicated automation (Villar & Khan, 2021). On the contrary, it seems that the smaller size of the SME resulted in a natural, flexible way of identifying work processes as well as a relief of getting rid of work tasks. This also ran counter to the usual threat and fear of RPA taking over work tasks (Davenport & Ronanki, 2018). On the contrary, the employees of the case were eager to learn more about RPA and how to further decrease their everyday work burden.

Even though the RPAs that were implemented in Lindgaard Pedersen only provided a smaller decrease in time spent, the changes were well received and could perhaps be used as a steppingstone for further projects within Lindgaard Pedersen when it comes to RPA development and implementations. Our findings through working with Lindgaard Pedersen suggest a need for further research on whether the impact of RPA and the features identified can engage employees of SMEs to self-propelling analysis and reflection of their own work processes using digitalisation tools. Another limitation of this research in progress paper is that we only followed one single case and we acknowledge that more cases could enhance the validity of the findings.

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