RPA Experiments in SMEs Through a Collaborative Network

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Abstract. Robotic Process Automation (RPA) technology has been widely applied in many types of organizations. It is embraced in the hope of increased productivity, quality, and employee satisfaction. Intelligent Automation, being its further enhancement will strongly impact Society 5.0, as it drives productivity through digital technologies, contributing to a more human-friendly working environment. Our research describes the implementation of RPA in financial processes at several SMEs in Finland, as well as the construction of a collaborative network for building and sharing expertise on RPA. With our multiple case study, we explored the main drivers of RPA implementation at SMEs. The research was conducted among 12 SMEs and numerous other organizations participating in a collaborative network for RPA. We conclude that the desire to automate routine work to increase satisfaction at work is the main driver behind RPA implementation in SMEs.

Keywords: Intelligent automation · collaborative networks · business process modelling · technology adoption · financial processes · RPA · Society 5.0 · SMEs

1 Introduction

The application and importance of Robotic Process Automation (RPA) is increasing in many types of organizations. It is triggered by such drivers as increased productivity, quality and job satisfaction as routine tasks are automated [1]. RPA may be applied to any field and tasks where repetitive processes exist in knowledge work. Intelligent automation through RPA is one factor that may contribute to the Society 5.0 as it drives productivity through digital technologies. At the same time, it may contribute to a more human-friendly working life as employees are freed from routine tasks and may concentrate on tasks requiring human competences. An RPA implementation typically begins by carefully modelling existing business processes [2]. Some parts of the modelling process or of the RPA process itself may employ artificial intelligence (AI). Examples of these are the automatic generation of rules based on business data and the task of automatic information extraction from invoices, respectively.

As the previous research on RPA adoption in SMEs is scarce, more research is needed to determine the reasons behind this. Hsiung and Wang [3] who explored the adoption of RPA in Taiwan SMEs suggested to scale the research to other continents and countries. The study of RPA adoption in SMEs by Turcu and Turcu [4], suggested to further study other departments and processes than HR. Also, Brzeziński [5] recommended to address the aspect of process management and governance in RPA implementations for the SMEs sector. According to Matthews and Greenspan, the Future of Work (FoW) will be driven by automation and collaborative robotics that require further exploration [6]. Addressing these recommendations, our research describes both the implementation of RPA in financial processes in several small and mediumsized enterprises (SMEs) in Finland and the construction of a collaborative network for building and sharing expertise on RPA. Hence, we formulated the following research questions:

RQ1: What drives SMEs in the implementation of RPA?
RQ2: What is the role of business process modelling in RPA implementations for SMEs?
RQ3: What is the role of a collaborative network in the business process transformation with RPA in SMEs?

The narrative of our paper is organized as follows: Sect. 2 describes related work and Sect. 3 describes the empirical setting and the company cases. The results are presented in Sect. 4. Section 5 analyses the significance of the results, both theoretically and in practical terms. Section 6 concludes the paper.

2 Related Work

RPA technology can be used to perform repetitive tasks, such as invoice or transaction processing, reporting, updating databases, data validation and filling in documents [7]. As many accounting, financial, and payroll tasks are repetitive, rule based and already in digital format, RPA is often started by automating company's accounting related tasks [8]. While it may trigger some doubts, or even fear among accountants' or other office workers, it may on the other hand increase job satisfaction and work-life balance when automating the mundane and boring tasks [9].

RPA automations can be implemented at task level, where software robots perform only one routine task such as bank reconciliation, extracting information from invoices, updating of master data information or transfer of information from one system to another. In such an arrangement, humans are only responsible for handling the exceptions [7]. In other words, the manual work of "extracting data from one system, performing data processing and moving the adjusted data to another system" [10] is automated. However, RPA can also support companies with the automation of an entire process, sometimes with some help of AI solutions [10]. In such cases, no manual intervention is needed, e.g. in a purchase invoice process that includes receiving, validating and paying the invoice. However, many researchers note that it is typical for organizations to start with task automations, while entire processes are typically automated only in large companies [11].

The importance of business process governance is growing, also due to the increased automation of processes [12]. This also applies for accounting processes as the well-governed processes are easier to automate with RPA. Even though Business Process

Management (BPM) is mostly used at large organizations, also SMEs can benefit from it [13]. BPM is a structured method of understanding, documenting, modelling, analysing, simulating, executing, and continuously changing end-to-end business processes and all relevant resources in relation to an organisation's ability to add value to the business. Aguirre and Rodriguez [1] present a case study where business processes have been automated through RPA. Through careful BPM, also SMEs can take well-informed decisions on the prioritization of automation pipelines in an organization. BPM provides information on which task automation would provide most added value to the business. This is very relevant also for SMEs, as their resources tend to be scarcer than those of large enterprises. IT governance helps to align decisions on RPA with the strategic objectives of a company [14].

RPA drivers and benefits can be categorized into four main groups: 1) Cost reduction, 2) Productivity enhancement, 3) Customer service improvement, and 4) Impact on employees. Each of the categories contains several detailed benefits, such as time savings or removal of non-value processes that are benefits linked to cost reduction, flexibility with capacity and working hours, as well as more detailed data capture and management. These solutions can enhance productivity, bring faster processes and quality improvements, improve customer service, and in the same time help employees by removing repetitive mundane tasks, increasing their job satisfaction and morale [11].

Collaborative networks, such as the European Digital Innovation Hubs (EDIHs) aim at enhancing and facilitating digital transformation in Europe. There are several AI and industrial automation related EDIHs, but no EDIH is specifically targeted at the automation of knowledge work. However, there are some networks that are developing standards relevant both for business process modelling and financial sector. An example of such is the Object Management Group Standards Development Organization, an international non-profit organization that gathers together organizations from the industry, government and academia. The way of working of individual experts is often very dependent of collaborative networks, by which we mean networks that consist of autonomous and heterogeneous entities that collaborate to achieve common or compatible goals through interaction that is made possible through computer networks [15] Financial experts may collaborate thorough various digital platforms and communication channels with other experts inside and outside of their organization and exchange ideas, knowledge and experiences.

3 Research Design

The research was conducted under an EU funded project 'Center of Intelligent Process Automation for SMEs (CIPAS)', run at Haaga-Helia University of Applied Sciences during 2021–2023. The project focused on providing training and consulting about digital accounting and automating accounting processes for SMEs in the capital region of Finland. As part of the project, the participants got an opportunity to implement their first RPA trials, and then decide whether they wish to implement it into their production environment.

Project participants were invited with an open invitation to join the project by email or by participating at different events organized by Haaga-Helia. Altogether 99 companies

and their 115 employees took part at the project. The first step was to participate in online webinars conducted by the project. The webinars consisted of one-hour sessions which contained information about what is RPA, how it can be implemented, how to improve processes and analyse business cases for RPA projects. Organizations could choose which seminars were the most interesting to them and participate in them freely.

After the webinars, the participants were welcome to take part at RPA and Process Development Workshops, which were one-day contact sessions, where the participants learned how to use the no-code/low-code RPA tools, such as UiPath StudioX or MS Power Automate. Alternatively, they had a chance to learn how to model their processes and recognize the tasks which could be automated, or just learn advanced Excel usage. These workshops contained hands-on training, where the participants learned how to use the software and build their own automations, as citizen developers. Over 50 companies participated in these workshops.

The workshops allowed participants to discuss and consider their own automation needs, and companies that had enough interest were selected to receive individual consulting. Additionally, the company's technological maturity level had to be sufficiently high in order to proceed into the consulting phase. Altogether, 12 participants were selected to receive company level consulting, where the automation needs were analysed and a RPA Proof Of Concept (PoC) was offered. The findings collected from those 12 case companies are presented in this paper. Case companies are listed in Table 1.

Table 1. The case companies, their sizes, industries and the automations done.

Company	Size	Industry	Turnover kEUR	Automation
Company 1	sole entrepreneur	accounting services	100	task digitalization
Company 2	small	accounting services	7,500	process development
Company 3	micro	accounting services	700	POC
Company 4	micro	other services	50	POC
Company 5	micro	trade	500	process development
Company 6	micro	accounting services	250	POC
Company 7	micro	accounting services	250	POC
Company 8	micro	other services	2,600	POC
Company 9	micro	accounting services	150	POC
Company 10	sole entrepreneur	other services	50	POC
Company 11	micro	trade	500	POC
Company 12	sole entrepreneur	accounting services	200	POC

The size of case companies varies both in number of employees and turnover. All companies are registered in southern Finland, in the Uusimaa area. Most of the companies were micro sized companies which employ 2–10 employees. Only one company employs 50–100 persons. Three participants were single entrepreneurs but had a registered limited liability company. Turnovers are rounded to 50 kEUR and varied from 50 kEUR to 7,6

million. What comes to the industry, 7 of the 12 companies provide accounting services, as our project was run in collaboration with the national accounting service providers union. The remaining 5 companies came from various businesses, 3 providing different kind of services either to private people or businesses, 2 being trade organizations and 1 of the participants had both own production and trade.

When joining the automation consulting stage, a one-hour online meeting was arranged where the potential automation task was described, so that the development and consulting could begin. In these meetings, the following topics were discussed: 1) Which task/process the company wanted to develop, 2) Defining the current state of the task/process, recognizing the challenges and bottlenecks, 3) Reasons behind the wish to develop and automate the task or process, 4) Possibilities for alternative automation solutions. It is good to notice that all cases were task automations instead of process automations. After the online meeting, the project consultant documented the process into a flowchart and the process was reviewed by the company representative in the next meeting. In this meeting the development and automation ideas were discussed, including analysing the possibility for an RPA PoC.

Automations or other developments done for case companies are presented in Table 2. Nine of the case companies had an RPA PoC was done, whereas for three of the participants other development ways were decided instead of RPA. Companies which did not advance to automation PoC had some challenges related to technological maturity level. Company 1 was a small accounting service provider, and its processes were mainly paper based, while the entrepreneur didn't have sufficient IT skills and awareness. For this company, we were able to digitalize part of the paper process, but it was suggested that further automation could be done after the entrepreneur got used to the new cloud-based tools. Company 2 had all digital accounting solutions in use, but the challenge was with process harmonization. Many employees were doing the same task in the company in different ways. In this case, task standardization was suggested and thus the company did not wish to proceed to RPA PoC yet. Company 5 had a very manual purchase process, which was not that suitable for business purposes and rather hindered company's growth. Suggestion was to first improve the process, and only after that consider any automation trials. Additionally, the IT-skills in the company were not on such a level that the company employees could maintain an RPA automated task.

For the companies that were chosen for a RPA PoC, the process was documented in detail, and an external service consultant prepared the POC either with Microsoft Power Automate, or UiPath StudioX. These two software platforms were seen as the most suitable for SMEs. Once the POC was ready, one final session was organized to present the results and give feedback. It was then up to the company to decide if they want to buy a production version of the solution from the service provider.

Table 2. The RPA automation POCs or other development done to case companies.

Company	Description of the automated/developed task
Company 1	Digitalizing a paper-based fund application process
Company 2	Suggestions for process harmonization in accounting document handling and uploading to accounting information system
Company 3	RPA POC for giving auditor a sample of documents to be audited manually
Company 4	RPA POC for Excel-based CRM automation with MS Teams-invitations and documentation prepared for the meeting
Company 5	Suggestions for process development in manual purchase invoice handling
Company 6	RPA POC which collects selected information from tax authorities' system, for example information requests and tax filing status
Company 7	RPA POC which based on information stored in excel does profit distribution related tax filing to tax authorities' system
Company 8	RPA POC which makes calendar reservations based on a project plan documented in a company's Excel template
Company 9	RPA POC which processes company's sales report in excel and does the needed tax filing into tax authorities' system
Company 10	RPA POC which issues customer invoices based on employees' calendar events
Company 11	RPA POC which automates excel based CRM's service booking and suggests service times for customers
Company 12	RPA POC which creates a needed set of folders for accounting customers' monthly document filing

4 Results

4.1 Regarding RPA Implementation Drivers for SMEs

The automation drivers for case companies are presented in Table 3. For most of them, the key reason was to get rid of repetitive tedious tasks and thus either improve employee satisfaction, or in the case of self-employed people, improve their own work. When discussing the objectives of automation, it was found to be the main driver for all companies, excluding 2, 3, and 6. Automating routine work and getting more satisfied employees can easily be understood when reviewing the automated tasks: company 1 had a manual, paper-based process to be developed, companies 4, 7, 8, 9 and 11 all used time in modifying MS Excel templates regularly, company 5 processed large number of pdf-based purchase documents manually. Company 10 wanted to automate the creation of hundreds of data folders for its customers, and company 12 automated its invoicing based on calendar notes. All these tasks might be time-consuming, but the processing is routine and does not need any human decision making, they were part of some other processes and were seen tasks which could easily be given to a 'digital helper'.

What comes to other companies' automation drivers, company 2 was a bigger accounting service provider and they had recognized a need for RPA as part of the

Table 3. Classifying the drivers for automation and tasks which were automated.

Company	Employee satisfaction	Internal quality assurance	Cost reduction	Increase productivity
Company 1	x			
Company 2			x	x
Company 3		x		
Company 4	x			
Company 5	x		x	
Company 6		x		
Company 7	x			
Company 8	x			
Company 9	x			
Company 10	x			
Company 11	x			
Company 12	x			

competitive environment. However, they had not used RPA yet. For them, cost reduction, increasing productivity, but also removing non-value tasks was brought up as the motivator. They had recognized tasks which were done by several accountants to several customers and saw the potential for automation on those. Also, company 5 mentioned cost savings as one of the motivations, they had negotiated with their accounting service provider that they would do more accounting work themselves and this way would pay less for the services. Nonetheless, eventually when the process got analysed deeper, the employee did spend quite much time on processing the invoices manually, and as did the accountant in the external service provider and the accounting fees were quite high. The manager of the company commented that they would not mind paying so much for accounting services, as long as they did not need to spend so much time processing the documents themselves.

Company 3 provided auditing and quality assurance services, and their driver for automation was to increase quality for the audit work they performed to minimize auditing risks. With an RPA PoC, the auditors could have a more systematic approach for auditing accounting documents. Obviously, larger auditing firms already have such automations, but for a smaller auditing company it might be too costly, and this had to be done manually. It is noticeable that audit services are such that are performed for a customer, but a quality improvement in audit does not affect the customer as much as it minimizes the auditor's risk of giving the wrong statement of the company. Thus, the quality improvement is internal. Similar internal quality improvement was sought by company 6, where the automation collected information on the company's customers' tax filing status. The company was responsible for over 100 customers' tax filing and in case being late, the tax authorities would impose sanctions which would fall for company 6 to be paid if it had been their mistake. To avoid this, the management of the company

wanted a checklist of the tax filing status for each of the customers. So, for these two companies the main driver was internal quality assurance.

4.2 Regarding the Role of Process Modelling at SME RPA Development

For each of the consulted companies at least two meetings were held to define the process or task companies wanted to automate. Before documenting the process, the regularity and time-consumption of the process was assessed. Only simple, regular and time-consuming processes or tasks were accepted for further development. Companies typically had a longer process in mind, but as it was their first RPA trial, the project budget was limited, and only one task or a small process was accepted for the PoC. None of the companies had process documentation in place and processes were documented by the project consultants with MS Visio or PowerPoint. This documentation or process modelling was essential for an external person to understand the process in question and often in the second meeting some corrections were made to the process documentation.

Once the process documentation was in place, the process was analysed to recognize bottlenecks or other challenges in the process. Solutions for the bottlenecks were searched from such perspectives as: 1) was the process part needed at all, 2) could existing software provide the solution. For example, for Company 1 where a grant application process was under analysis, some data collection phases were moved into latter phase of the process, as it was not necessary to collect such information from everyone who had send the application. This way the process was simplified. For company 1 several development points were recognized – also ones which could have been automated with RPA, but as the company was not technologically mature, it was decided to digitalize the most time-consuming and paper-based task. The maintenance of the possible software robots would have been challenging for the company. Company 5 also had several automation options, but their purchase process was not optimal for business purposes and thus the project team did not recommend automating such a process, but rather gave suggestions on how to digitalize their accounting and use their existing sales and purchase system more efficiently.

In all cases, the new process was documented as well and given to the case company. Some of the companies' employees were not the ones who made the final decision on the process development and RPA. They asked for the project documentation so they could communicate about the coming development and get approval for it. Thus, the project documentation was used in several manners in the project and had important role.

4.3 Regarding the Role of Collaborative Network at SME Digital Transformation with RPA

In the beginning of the project, a service design method was applied to find out the RPA needs of the companies. Three points were diagnosed: first, respondents were interested of the benefits of RPA, secondly, they wanted to know what peer companies had done with RPA, and thirdly the participants preferred RPA trainings and services which would be provided independently of time or place. Also, many participants did not know what RPA was, so raising awareness was needed.

Benefits and experiences of RPA were shared during various events. In the beginning, it was difficult to find participants in the project, but eventually the project started to attract more participants. However, it was learnt that SMEs are extremely busy and were not keen on participating in RPA events arranged by the project. Most probably the companies didn't even know what RPA was and thus such events were easily ignored. Consequently, the project team realized that information should be shared in networks where the entrepreneurs already are. For this reason, the project team started to participate at other industry events: run by organizations such as Finnish Association of Accounting service providers, Real Estate Management Federation and The Federation of Finnish Entrepreneurs. In addition, originally the project team was planning to create a platform where SMEs could discuss their RPA needs and challenges as the RPA POCs are universal, while the companies would prefer to learn about RPA examples of their own industry. Again, these associations and federations would maybe be the correct place for this kind of discussion, whereas different projects could just bring in new knowledge.

The training courses and services were provided both remotely, but also in contact sessions. Even though the original wish was to have time and place independent training courses, the project specialists felt it was easier to give software training in a contact session, rather than remotely. However, lots of webinar recordings were offered. In the future, also the software training should be provided virtually and maybe short video recordings to be done on how to build small automations.

What was learnt during the project but not recognized in the service design analysis was the usefulness of test-before-invest concept. Testing before investing is a service concept provided e.g. by European Innovation Digital Hubs which allows SMEs experimenting new technologies before actually investing in them [16, 17]. Project was EU-funded and provided the services free of charge, for a small company this is certainly a needed approach. In our project the POCs or POCs were provided for the companies but if the company wanted to implement them in real-life, they needed to get a production version from the consulting company who had created the POC. Without this possibility most of the case companies might not have tested RPA automations or started to develop their work with automation.

Project shared information about RPA possibilities success, only Company 2 had previous experience with office work automation and RPA. This company was bigger than the others and had done some automation trials before, however they had not implemented any solution yet. All the other companies either had participated in some of the Center of Intelligent Automation for SMEs project's training courses, just an Excel training or watched some webinars on what RPA is. In these training courses the project specialists discussed with companies, and the participants understood the possibilities of automation. Additionally, the training and workshops served as an experience sharing event. Some of the project participants did not proceed to the PoC-phase, but participated in a citizen development workshop with UiPath StudioX or MS Power Automate. Usually, these participants had already made their first trials with automation and shared their experience openly with others. Sharing information on what other similar companies had done either by the project team or by the participants was essential in raising the interest of starting the automation also in the case companies. Knowing the benefits

and experiences of automation achieved by others was important when deciding to apply RPA in companies' own processes.

5 Discussion

When analysing the drivers of RPA implementation in the Nordic companies, we can use the four category classification: 1) Cost reduction, 2) Productivity enhancement, 3) Customer service enhancement and 4) Impact on employees [11] In our study, focusing on the RPA adoption in SMEs, category 4) Impact on employees was the most important driver. We also found out that the improvement of internal processes quality was an important driver for RPA implementation for some SMEs, which is a novel contribution to the available literature.

We agree with Chong [13] and Jurczuk [12] that business process governance: especially process understanding, documentation and analysis is essential for its successful automation, also when SMEs and micro-sized companies want to automate their processes no matter how small the automated task would be. Proper BPM enables smooth RPA implementation, and in our study the companies were able to use proof-of-concepts that were the result of proper process analysis.

In addition to the findings concerning the added value that the SMEs saw in implementing RPA, we observed that the tasks that were chosen by the SME for the RPA proof-of-concept were the simplest ones with the smallest number of exceptions. Also, repetitive tasks were chosen, but it was the second most important criteria. This is in line with the findings from Sharma et al. [18].

Our study encompassed the very first stage of RPA implementation, i.e. the "test before invest" stage. Additionally, our study does not discuss the actual decisions on taking RPA into use in the SME, as the 12 cases were dealing with companies that implemented the PoC. An RPA implementation would be the next step in the process. A future study could address SMEs that have actually implemented RPA.

The second part of the study contained the establishment of a collaborative network for RPA knowledge creation and sharing among SMEs. The network consisted of over 100 SMEs interested in RPA, companies offering RPA services and non-profit organizations, such as a university and associations for financial experts, entrepreneurs and other professionals. Large organizations typically create organization-wide Centers of Excellence (CoEs), focused on aligning organizational resources, establishing standards and tools, providing training and education to establish RPA readiness. Sharma et al. [18] found that CoEs are positively related to the intention to adopt RPA. Our study focused on micro-enterprises of less than 10 people. These firms cannot have organization specific CoEs because of the small organization size. Thus, the Center for Intelligent Automation was created to take over at least some of the tasks that large organizations typically handle through CoEs. Collaborative networks, of which the Center for Intelligent Automation is an example, play an important role in digitalization [19].

6 Conclusions

RPA is often implemented in larger companies, but smaller organizations such as SMEs or even micro-sized companies may equally benefit from it. Once learned about the automation possibilities, even small companies are willing to get rid of the repetitive routine tasks and thus improve their employee satisfaction. SMEs may also see in RPA a possibility to improve their internal quality or to enable substantial cost savings. However, currently many SMEs and micro-sized companies are still implementing their first RPA trials and automation is not yet in the companies' strategy. Additionally, efficiency related benefits of RPA are not yet widely seen by SMEs. Well planned RPA in a small company can benefit the organization in many ways. Consequently, SMEs should learn how to use these tools.

Surprisingly, our case companies did not see RPA as a competitive factor yet. Even there were companies from same industries, they were willing to share their RPA ideas with others. However, the project did only one RPA PoC for each company, and it was required them to be as multipliable and scalable RPA PoCs as possible. Probably a larger set of RPA automations would not be shared with competitors.

To avoid faulty investments and automations of wrong tasks, even smaller organizations should find the time to go through their processes and thus identify the ones which should be developed. SMEs' resources are scarce, and thus should be used wisely, however too much time spent on planning might make them lose the competitive advantage of RPA. Nevertheless, before a SME automatizes its accounting processes, the process should be as digital as possible as this might already bring the benefits looked for.

Small organizations with limited number of employees, R&D funds and knowledge are not usually the front-runners in new technologies and innovations. They tend to wait until evidence of the benefits of the new technologies is demonstrated and preferably by their peers. Co-operation with national federations, universities and non-profit organizations provides good opportunities for learning and implementing new technologies, such as RPA and AI. Fortunately, at least in Europe, projects supporting SMEs have been funded quite well and with help of collaborative networks SMEs will remain competitive. It is crucial, that the SMEs understand the importance of improving and questioning the current ways of working.

Considering our limitations, our case explored organizations from only one country, so it would be interesting to extend this research beyond Finland and study also other locations. Moreover, it is recommended to study more examples and cases of RPA technology implementations from the perspective of its synergy with process management and process improvement. In the upcoming months, due to the rapid growth in the popularity and importance of AI solutions (such as ChatPGT), it is also recommended to explore how RPA products could be transformed to provide better and more approachable offerings of automation services not only to large organizations, but also to medium and small enterprises (SMEs) that would like to deploy this technology and collaborate with software robots and assistance, as part of hybrid workforce.

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