ROBOTIC PROCESS AUTOMATION IN SMALL AND MEDIUM ENTERPRISES – A REVIEW

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Abstract
Robotic process automation (RPA) is relatively new software technology that is quickly being adopted by companies around the globe to free office workers from routine, monotonous and rule-based tasks letting them invest their time in higher complexity and value tasks. While big companies have money, time and workforce resources to implement RPA, small and medium enterprises (SME) fall behind in their effort to start using RPA despite the fact that for this segment of organizations RPA would be useful as it presents the opportunity to re-arrange their limited resources and delegate part of work to software. To address this situation, the aim of this paper is to conduct systematic review of literature regarding RPA appliances in enterprises in order to find out how to implement RPA successfully, what processes to give to RPA, and how SMEs can implement RPA better. During the review main guidelines on how to implement RPA in enterprise in general and which processes to delegate to RPA in particular were identified as well as challenges RPA implementation might bring to company. It was also noted that there is missing research on how to adopt RPA specifically in SMEs segment. The conclusion is that SMEs aimed RPA implementation guidelines are missing.
Key words: robotic process automation, small and medium enterprises.

Introduction

Robotic process automation (RPA) is a software that literally replicates human actions on computer following the same rule based routine tasks like moving the mouse around the screen, clicking on buttons, links, etc., reading and writing data across different applications desktop or web or else, doing calculations, moving or creating files, interacting with PDFs and other document formats, using optical character recognition (OCR) and other technology.

In 2023, there were around 24.4 million small and medium enterprises (SME) in the European Union (EU) employing around 85 million people and creating half of the value added to EU's economy. Out of those enterprises one third have adopted one basic digital technology, one fourth said they need advanced digital technology and have adopted it, one tenth considers the adaptation of advanced digital technology but 8% of SMEs haven't adopted anything due to lack of knowledge or financing (Statista, 2023).

In a meantime, the so-called Digital Transformation (DT) is having huge importance for companies across all spheres of work because it changes the relationship with customers, suppliers, human resources and the creation of value (Zaoui & Souissi, 2020). And when SMEs stay behind the curve, competition with advanced SMEs and bigger companies just get tougher.

The usage of RPA in organizations has rapidly increased in recent years and is projected to grow in the foreseeable future by 20-30% per year. The implementation of RPA as per expectations will increase productivity by 86%, quality by 90% and reduce office costs by 59% (Denagama Vitharanage *et al.*, 2020; Choi *et al.*, 2021; Axmann & Harmoko, 2021).

Considering the RPA potential, it is important to understand how to apply the RPA to SMEs, which processes to give to RPA, to what challenges enterprises should prepare before implementation of RPA, how to prepare workforce for the coming changes.

To address these issues, this paper conducts a systematic review of literature regarding RPA in enterprises in first part doing bibliometric analysis in order to understand main keywords, publishers and authors in the field, in the second part content analysis is conducted in order to understand what is found in current literature about questions concerning this topic.

Materials and Methods

This systematic review of RPA in SMEs includes both bibliometric and content analysis. The analysis process has been shown in 'Figure 1' and follows the approach designed by Liu *et al.* (2021).
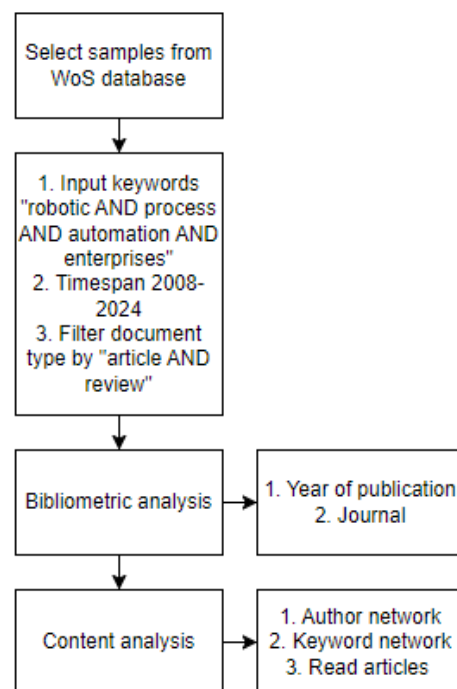

Figure 1. Phases of systematic review.

For this study the Web of Science database was used. The search criteria for topic were 'robotic AND process AND automation AND enterprises', period was from 2008 when higher volume of publications start to appear until 2023, and paper types were article and review.

This way 138 articles were found.

Using CiteSpace (Chen, 2006) software the network map of the most influential journals, authors and keywords in the topic were drawn.

Secondly, answers to questions that are important to be answered in order to understand the situation of RPA in SMEs were searched for:

RQ1: What are the features of successful RPA implementation?

RQ2: How to determine RPA fit process?

RQ3: What are the challenges of RPA adoption?

RQ4: What are the gaps in research?

Results and Discussion
Bibliometric findings
Research on RPA had a single publication each year starting from 1999, but it ramps up from 2008 having 2019 and 2021 as the most published in years 'Figure 2'.
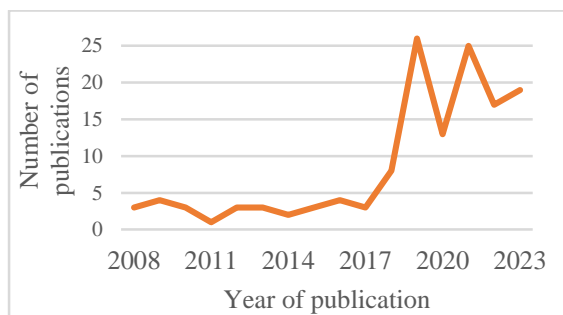

Figure 2. Annual publications on RPA in enterprises topic.

This increase of academic interest in the topic and following articles can be explained by the growing appliance of RPA. Industry well known main RPA vendors were founded in the beginning of 2000's – Blue Prism in 2001, Automation Anywhere in 2003, UiPath in 2005, fulfilling demand for RPA and the industry went up from there.
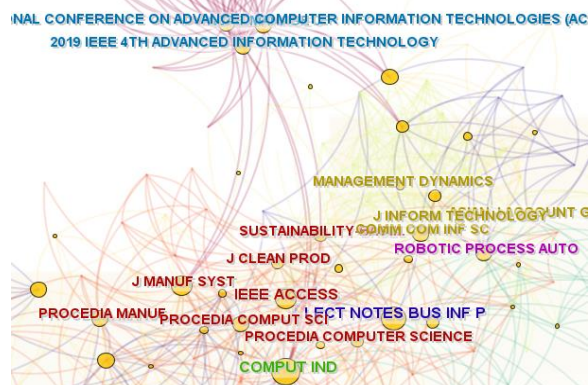*Content analysis*

Figure 3. Most influential journals.

Drawing on the co-reference analysis the most influential journals on the topic were found as seen in 'Figure 3' (Computers in Industry, 2024; Lecture Notes in Business Information Processing, 2024; IEEE Access, 2024).

Similarly, the most influential authors were found to be S. Aguirre, D. Fernandez and S. Anagnoste as seen in 'Figure 4'.

Aguirre has one very cited article (Aguirre & Rodriguez, 2017) which is one of the first use cases documented in literature hence the popularity and many citations.

Anagnoste's most cited article by far is about how RPA can improve the work of back-office operations (Anagnoste, 2017).

Most cited article by Fernandez is also published at the beginning of the RPA research popularity surge and just like previously mentioned articles this early publishing made them very cited across later papers (Fernandez & Aman, 2018).
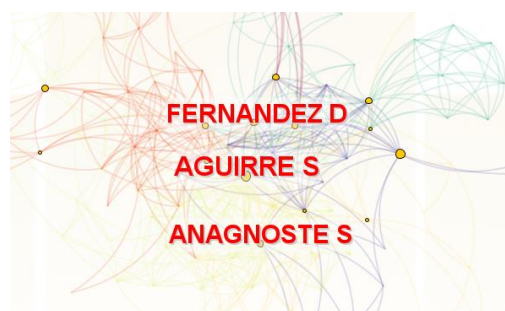

Figure 4. Most influential authors.

Finally, most popular keywords in the topic were found out similarly and include DT, artificial intelligence, industry 4.0, framework, design to name a few as seen in 'Figure 5'.
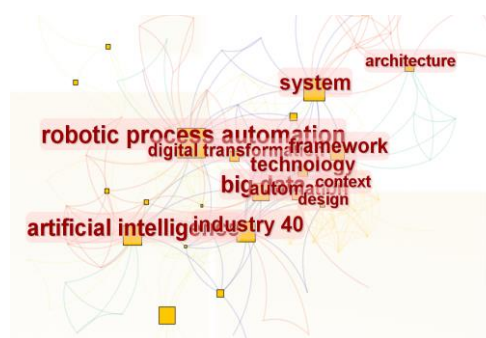

Figure 5. Most popular keywords in the topic.

RQ1: What are the features of successful RPA implementation?
While analyzing the selected articles, it became clear that independently of enterprise's size, industry and other factors, there are common approaches that lead to successful implementation of RPA.

Enterprises tend to follow a 4 or 5 stage implementation framework where 4 staged one is the

most popular – identifying process, defining AS-IS to TO-BE, then followed by bot development and the monitoring of actions (Huang & Vasarhelyi, 2019). 5 staged framework is basically the same but includes testing stage in it (Gex & Minor, 2019).

Before starting with RPA regular practice is to do proof of concept (PoC) process, where with specially selected process desired RPA tool is tested so that it is what a client thinks to avoid later disappointment as a law low complexity, high volume and value processes are preferred (Gex & Minor, 2019; Lacity, Willcocks, & Craig, 2015; Flechsig, Anslinger, & Lasch, 2022).

Common practice is to establish centers of excellence (CoE) when adopting RPA within a company. CoE's benefits over outsourcing are thought to be familiarity with processes, access to confidential information and environment where robots will be implemented (Huang & Vasarhelyi, 2019; Vokoun & Zelenka, 2021).

Also, an important aspect to mention is shaping people's mindset regarding RPA as usually with something new, there is doubt regarding the future and in case of RPA it is quite worrisome that if a robot will start to do your job what will you do then? To address employee's mindset changes, it is common for organizations to do seminars on RPA where RPA's idea, potential and benefits are showcasing through use cases. Invention of RPA ambassadors is also one of the tactics used by companies by assigning this role to specific people inside company who will then work to foster a positive outlook on the emerging technology inside the company. These activities helped in reducing worker's fear regarding job loss by showing them that instead of layoffs RPA will free employees from boring routine work letting them do higher complexity and value tasks (Ågnes, 2021; Marciniak & Stanislawski, 2021).

RQ2: How to determine RPA fit process?
A good process to be delegated for RPA according to published articles first of all is rules based – process that follows strict rules and doesn't include judgement or any other human value during process steps and therefore could be automated through if-then decision trees (Hallikainen, Bekkhus, & Pan, 2018; Viale & Zouari, 2020; Kokina & Blanchette, 2021; Kedziora & Penttinen, 2021).

Also, it is mentioned that process should be matured which means it is already polished and won't be a subject to a lot of changes in the future because for RPA every time something changes in process RPA needs re-development that takes time, money, etc (Hedge, Gopalakrishnan, & Wade, 2018; Viale & Zouari, 2020; Vokoun & Zelenka, 2021).

Continuously, it is good to have processes that are routine ones – that happen every then and now and the more often the better. Another benefit for such processes is that their start time can be established while developing and then process can be triggered, for instance, every Monday at noon and executed fully automatically without any human interference

(Wewerka, Dax, & Reichert, 2020; Kokina & Blanchette, 2021; Choi, R'bigui, & Cho, 2021).

Extra gains happen when the same process is done frequently or by a lot of people. In this case developers still use resources to develop one process, but its returns are much higher because process can be scaled up to work on multiple machines meaning significant amount of real worker's working hours saved. Another thing to consider is that with frequent and ample processes the amount of idle time of robot is reduced meaning less license and infrastructure money is wasted in downtime. That's why high-volume processes should be considered a priority for automation as they yield the highest potential benefits and return of investment (Hedge, Gopalakrishnan, & Wade, 2018; Wewerka, Dax, & Reichert, 2020; Viale & Zouari, 2020).

Also, processes that interact with multiple systems should be considered a good fit for RPA because when performed manually, with each additional system human interacts the probability of human error increases. While these processes might not bring the most returns in general, in cases of sensitive tasks the RPA dominance in error less performance of tasks can bring significant value and save unexpected time and expenses spent on fixing such human errors (Wewerka, Dax, & Reichert, 2020).

RQ3: What are the challenges of RPA adoption?
One of the main challenges is resistance within companies implementing RPA as employees of all levels tend to see RPA as a threat to their jobs. This opinion is mostly based on the lack of awareness of what RPA is about and how its adoption will impact their work in the most general sense (Marciniak & Stanislawski, 2021).

Another issue is that people by nature are cautious of change and are usually happy with the well-known current organization of things. Without clear orders from upper management, they didn't move towards RPA (Viale & Zouari, 2020).

If the company has a lot of paperwork that isn't digitalized, it's a big problem as RPA is good with well digitized processes, as it is hard to extract information from paper, so before RPA this move towards digitalization should be considered as pre-requisite. In broader sense, going from paper to digital isn't just about documents and RPA but change of philosophy in company in general that it is changing its management model moving from traditional to advanced model. And only after this switch can RPA and other advanced digital solutions be implemented with less problems or be implemented at all (Wewerka, Dax, & Reichert, 2020).

RQ4: What are the gaps in research?
RPA implementation framework and which processes to give to RPA are questions that seem to be answered in general; research if the same approach can be used by SMEs considering SMEs limited resources and different organizational structure is missing.

Also, it would be interesting to see if the same challenges apply to SMEs that were found in literature concerning bigger companies again because SMEs have different employee structure and management.

Research on local SMEs would also be useful to see how well local SMEs adopt RPA, most often how well they don't do that and why, as there should be local nuances if we take into consideration general economical situation in the country, general trends regarding digitization in the country and other local characteristics that may differ from cases found in literature from elsewhere.

Conclusions

1. After years of little interest, RPA finally got some push in the beginning of 2000's with demand being satisfied by foundation of few main RPA vendors, and in a matter of few years industry was grown enough for published academic research papers to grow significantly.

2. Companies who have implemented RPA follow the same 4 to 5 step implementation framework. PoC practice is also common across adopters.

3. Process that is fit for RPA is rules-based, matured, has high volume and value, and doesn't require human decision-making capabilities.

4. Main challenges are human based – workforce fears losing job to robots. To address this issue, it is common practice to work towards employee perception of what RPA is and what their future in the company will be.

5. There are gaps in research regarding how RPA appliance works in SMEs and how to make RPA better for SMEs, so this segment adopts this technology faster.

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