

The impact of robotic process automation in financial institutions

Uticaj robotske automatizacije procesa u finansijskim institucijama

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Abstract

A digital transformation of business affects all companies, regardless of their plans, and encourages a constant search for new methods of performing tasks. The implementation and use of new technology is often necessary when introducing changes to current ways of working. Financial technologies - FinTech and robotic process automation (RPA) as one of its phenomena, emerged as a result of this category of changes in finance. The purpose of this paper is to familiarize readers with the advantages and disadvantages, as well as the impact of robotic process automation in financial institutions. By searching Web of Science and SCOPUS, an analysis of the existing literature was carried out to achieve the goal of the study. According to the systematic literature review, robotic process automation technology has numerous advantages over its disadvantages. Moreover, its implementation doesn't necessarily require other major organizational changes such as process redesigning or modifying the existing information systems.

Keywords: robotic process automation, fintech, financial institution, banking sector, systematic literature review

Sažetak

Većina privrednih subjekata je bez obzira na njihovu želju izložena uticaju digitalne transformacije poslovanja koja stvara potrebu za kontinuiranom potragom i otkrivanjem novih načina realizacije poslova. Uvođenje promena u dosadašnje načine rada često može da podrazumeva implementaciju i upotrebu novih tehnoloških mogućnosti. Ova kategorija promena u oblasti finansija je doprinela nastanku finansijskih tehnologija - Fintek i robotske automatizacije procesa kao jedne od njegovih pojava. Cilj ovog rada je upoznavanje sa prednostima, nedostacima i uticajima implementacije robotske automatizacije procesa u finansijskim institucijama. Kako bi se ostvario postavljeni cilj istraživanja sprovedena je analiza postojeće literature do koje se došlo pretragom baza radova Web of Science i SCOPUS. Rezultati sistematskog pregleda literature ukazuju na brojne benefite upotrebe tehnologije robotske automatizacije procese koje nadmašuju njegove nedostatke. Utvrđeno je da njegova implementacija ne zahteva nužno i druge velike organizacione promene poput redizajna procesa ili promene postojećih informacionih sistema.

Ključne reči: robotska automatizacija procesa, fintek, finansijske institucije, bankarski sektor, sistematski pregled literature


1. Introduction

Over the past decades, continuous changes in all aspects of business have created numerous opportunities as well as challenges that require new ways of doing business. These changes can be focused either on the market and improving external business results or on the internal business and strengthening internal efficiency and effectiveness. A wave of changes that were largely digital in nature and employed digital technologies did not bypass financial institutions, which spawned the term of financial technology or FinTech.

Digital and other technologies are maturing, leading to a digital society, which makes it more important for financial and other regulatory sectors to integrate innovative applications (Khan et al., 2022). All financial institutions are constantly looking for ways to improve their operations in the face of these challenges. Management of the banking industry, as the largest representative of the financial sector, is undergoing major changes due to technological innovations, interconnected with market, legal and social factors (Gancarczyk et al., 2022).

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Financial technologies have emerged as financial services providers become less adaptive to market needs (Firmansyah & Harsanto, 2022). According to the authors' definitions, *FinTech*, *Fin-Tech* or *fin-tech* was first referred to in 1972 (Milian et al., 2019), and today it is described as an umbrella term for disruptive technologies in financial institutions (Salleh & Tasnim, 2022).

Arner et al., (2015) emphasize the importance of understanding FinTech's different eras: FinTech 1.0, FinTech 2.0 and FinTech 3.0. The first phase, Fintech 1.0, lasted from 1866 to 1987. An infrastructure was built during this phase to facilitate the interconnection of financial institutions as well as their connection with clients (Singh et al., 2021). Suryono et al. (2020) confirm the mentioned period as the beginning of Fintech development as well as that the history of technological innovation in finance begins in 1945 with the introduction of cheques. First credit cards were issued by Bank of America in 1958, and in 1967 Barclays, a British multinational universal bank, introduced the first ATMs to facilitate financial transactions (Arner et al., 2015; Suryono et al., 2020). This marks the beginning of a new phase - FinTech 2.0. During this phase, from 1967 until the global financial crisis of 2008, financial institutions increasingly digitized and used information technology (IT), gradually replacing paper-based operations (Arner et al., 2015; Singh et al., 2021). Global financial crisis of 2008 revealed all the weaknesses of the traditional financial services sector (Salleh & Tasnim, 2022), and it ushered in a new era in the development of financial technologies known as FinTech 3.0. As part of this ongoing phase, a number of new financial companies have emerged, driven by technology, that provide financial services and operate alongside traditional banking sector (Cortina & Schmukler, 2018; Singh et al., 2021).

As financial technologies develop very quickly, they are reconfiguring existing activities and contributing to diverse effects through a variety of services (Gancarczyk et al., 2022; Karsen et al., 2019). In this regard, the financial institutions is exploring the possibilities of robotizing operations to enhance business goals in the digital age (Bisht et al., 2022). Automating processes and repetitive activities can reduce costs and human errors, and direct employees toward activities that create greater value (Ghandour, 2021). The technology of robotic process automation makes it possible to automate such process activities.

In order to address the significant research gaps regarding the use of robotic process automation technology in financial institutions while adapting to digital challenges, it is necessary to identify and systematize the observed impacts to provide information for future research and implementation decisions.

Two research questions were defined for this research to meet its objectives, namely, to provide researchers and practitioners with a structured, categorized view of the literature on RPA technology in finance:

- RQ1 What are the benefits and issues of applying robotic process automation?
- RQ2 Does robotic process automation require significant changes to existing IT infrastructure and business processes?

The banking sector represents one of the most essential segments of financial construction (Kalaš et al., 2025). Besides banks, the financial sector also includes many other institutions, such as the central bank, savings banks, trust companies, investment funds, brokerage companies, leasing companies, insurance companies, and voluntary pension funds. It was, however, evident during the publication search those discussions regarding financial technologies and their application primarily addressed banks. Considering they are the most popular and important financial institutions that account for the largest share of the financial market, this should not be surprising. In addition to banks, insurance companies and accounting and auditing agencies are the financial institutions most often mentioned in the studies.

This research describes the research methodology after the introduction. A summary of research results is presented in the third chapter, followed by answers to the research questions, while the concluding remarks are presented in the final section.

2. Methodology

This theoretical research follows the steps defined by Barbara Kitchenham (2004). Her approach consists of eight steps divided into three phases (Figure 1).

2.1. Planning phase

The process of research planning consists of identifying a need for research and developing a protocol for its implementation. The procedure entails making all the decisions required for successful research. In this phase: research questions and objectives are defined; the search keywords are determined; databases of studies to be searched are selected; the inclusion/exclusion criteria as well as the criteria for determining the quality of studies are defined.

Following are the research questions that shaped all subsequent activities in the research:

- RQ1 What are the benefits and issues of applying RPA?
- RQ2 Does robotic process automation require significant changes to existing IT infrastructure and business processes?

RQ1 contributes to the research objectives by revealing the positive and negative impacts of applying RPA in financial institutions. RQ2 identifies the need for technological and organizational changes in order to implement software robots.

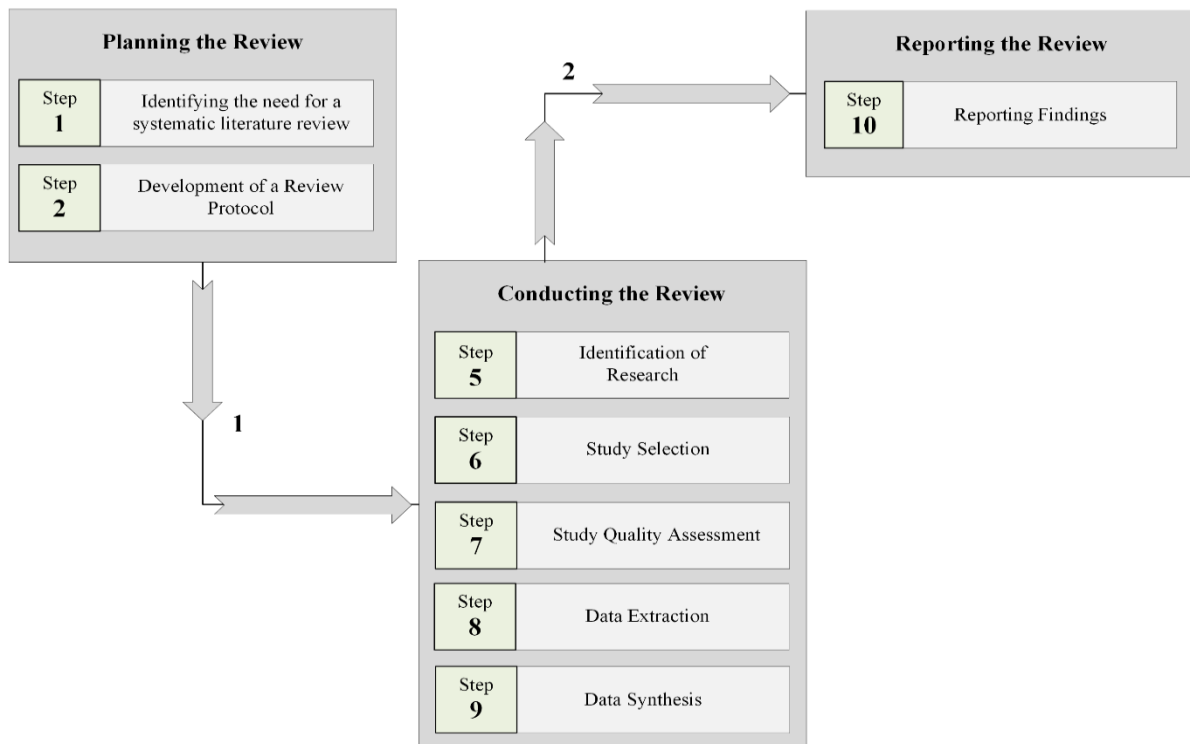
A general aim of the study is to provide a theoretical overview of RPA technology and its impact on financial

institutions. In order to realize the research goal, the following tasks must be undertaken:

- Determine the positive effects and challenges of applying RPA technology in financial institutions;

- Determine the need for internal changes to implement RPA.

Figure 1. Methodology of a systematic literature review



Source: Kitchenham, B. (2004). *Procedures for Performing Systematic Reviews*. In Keele University Technical Report TR/SE-0401

Prior to selecting databases and key search terms, it was crucial to define the research questions and objectives. It was decided to conduct the search using the Web of Science and SCOPUS index databases since both research questions involve the analysis of existing scientific literature. Databases of selected papers can be accessed via the academic services of the Serbian Library Consortium (KoBson).

Search keywords are also defined along with the selected search databases. Table 1 contains used combinations of key terms and the number of hits.

Table 1. Combinations of keywords and the number of hits

Keywords	Number of hits (WoS)	Number of hits (Scopus)
"Robotic Process Automation" AND "FinTech"	0	8
"Robotic Process Automation" AND "Financial institution"	3	7
"Robotic Process Automation" AND "Financial sector"	3	4
"Robotic Process Automation" AND "Banking sector"	3	13
"FinTech" AND "Systematic literature review"	27	37
Total	36	69

Source: Authors

The inclusion/exclusion criteria of scientific papers were defined so that the most suitable papers could be selected for this research to be implemented successfully.

- Inclusion criteria: publications in English about financial institutions that were published in journals or conferences are included in the final set.
- Exclusion criteria: The systematic review of the literature excludes papers written in languages other than English and whose content is not related to robotic process automation or finance. Due to the recent nature of this technology, which has only been studied in the academic community for the past 8-9 years, time was not considered an exclusion criterion. In addition, papers with fewer than four pages were excluded from further analysis.

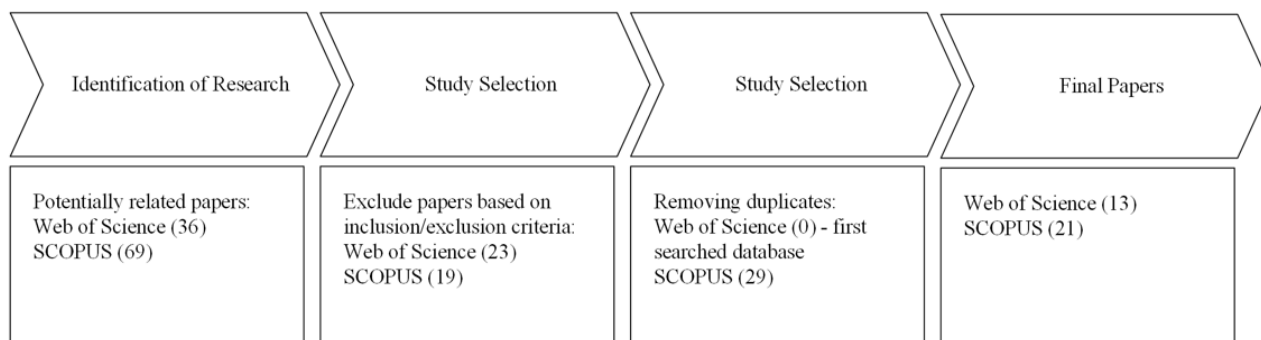
2.2. Performing a literature review

In this phase, database searches were conducted using keywords, publications that addressed the defined research questions were identified and duplicates were eliminated. Data extraction and synthesis were carried out after obtaining the final list of papers. A total of 105 papers were identified. Based on the evaluation criteria defined, 34 papers were selected for further consideration. There were 29 duplicates removed. Another 17 papers were rejected due to their focus on different technologies. Spanish was used in 3 papers. Nine scientific publications were rejected because their full texts were unavailable.

Based on the authors' subjective assessment, 3 more papers were excluded from further analysis, while the other 10 papers had no relevance to finance. The *forward and backward* analysis included 5 more papers, resulting

in 39 scientific publications. Each of these papers was read thoroughly and analysed against the set research objectives. A flowchart of the paper selection process is shown in Figure 2.

Figure 2. Selection process flowchart



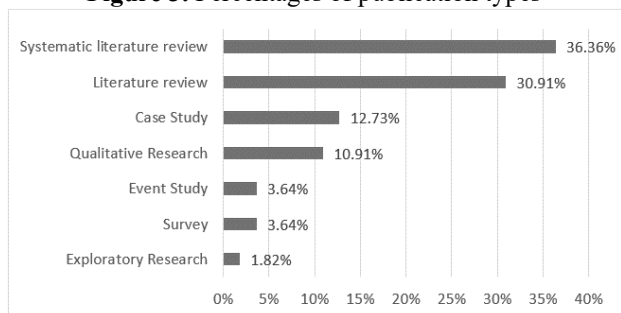
Source: Authors

Among the final publications, 18 papers were published at conferences and the rest in journals. A systematic literature review accounts for slightly more than 36% of the studies. About 31% of papers are literature reviews. Among other types of publications, only qualitative research (10.91%) and case study (12.73%) have a share greater than 10%. Combined, other types of publications represent less than 10% of the total (Figure 3).

request, which required a certain period of time for the employees to prepare them (Herm et al., 2022).

The more employees are involved in the performance of various tasks, the more errors and undesirable outcomes are likely to occur. A robot is programmed to perform defined tasks using established standards and predefined rules. Therefore, human errors are minimized or avoided in most cases (Huang & Vasarhelyi, 2019) which leads to improved organizational performance (Fernandez & Aman, 2018), increased productivity, efficiency, and user experience (Rameshbabu, 2021). By using chatbots or automated emails, RPA improves the user experience by responding to user requests and queries instantly and with better quality (Thekkethil et al., 2021). By developing software robots that carried out customer verification, analysis, decision-making, and notification of the loan approval outcome, MUFG Union Bank accelerated the implementation of the loan approval process (Maček et al., 2020).

Figure 3. Percentages of publication types



Source: Authors

3. Research results

This section describes the research results and provides answers to the defined research questions.

3.1. Research question 1: What are the benefits and issues of applying robotic process automation?

RPA has been widely adopted by financial institutions because of the low cost of implementation and large potential benefits (Huang & Vasarhelyi, 2019). Successful implementation of a robot allows the process to be managed 24/7, without interruption, at a lower cost than hiring an employee (Ahmet Unal & Bolukbas, 2021; Kanakov & Prokhorov, 2020). Unlike humans, robots are not prone to fatigue or exhaustion (Benkalai et al., 2020). By introducing software robots, State Bank of Hyderabad (SBH) enabled users to calculate fees in case of premature termination of the contract at any time. It was previously impossible to obtain these calculations without a special

When routine and boring tasks are delegated to robots, employees can focus on more challenging work and higher-level tasks, which increases the quality of products and services (Choi et al., 2021; Sobczak, 2021). As a result, employee satisfaction and retention increase (Rameshbabu, 2021). Automating repetitive activities affects consistency as the same tasks are performed each time the need arises. Consequently, operational risk is reduced and work quality is improved (Vijai et al., 2020). The Indian private bank ICICI reduced execution time by 60% and increased accuracy rate due to robotic process automation technology used to process millions of transactions (Choubey & Sharma, 2021).

Since RPA technology is safe for organizations, the IT requirement related to security can be easily met (Villar & Khan, 2021). Fraud risks can be mitigated through various RPA methods such as re-evaluating current processes, improving transaction monitoring, detecting threats and anomalies automatically (Thekkethil et al., 2021). Moreover, well-implemented RPA can create high-performing teams, in which humans and robots

complement each other (Iden, 2017). Since it is almost impossible to manually monitor transactions in order to detect illegal activities, Vakif Participation Bank automated this process by a robot, which not only monitors and identifies unwanted transactions, but also sends a report to the financial crimes investigation committee (Ahmet Unal & Bolukbas, 2021).

Simple and powerful RPA tools can save costs and increase performance metrics without increasing staffing (Choi et al., 2021). Thus, when purchasing software, a short-term increase in cost results in a long-term reduction in salary costs (Devarajan, 2018; Lacurezeanu et al., 2020). The use of RPA has reduced operational costs in banking and other organizations by 30% to 70% (Thekkethil et al., 2021).

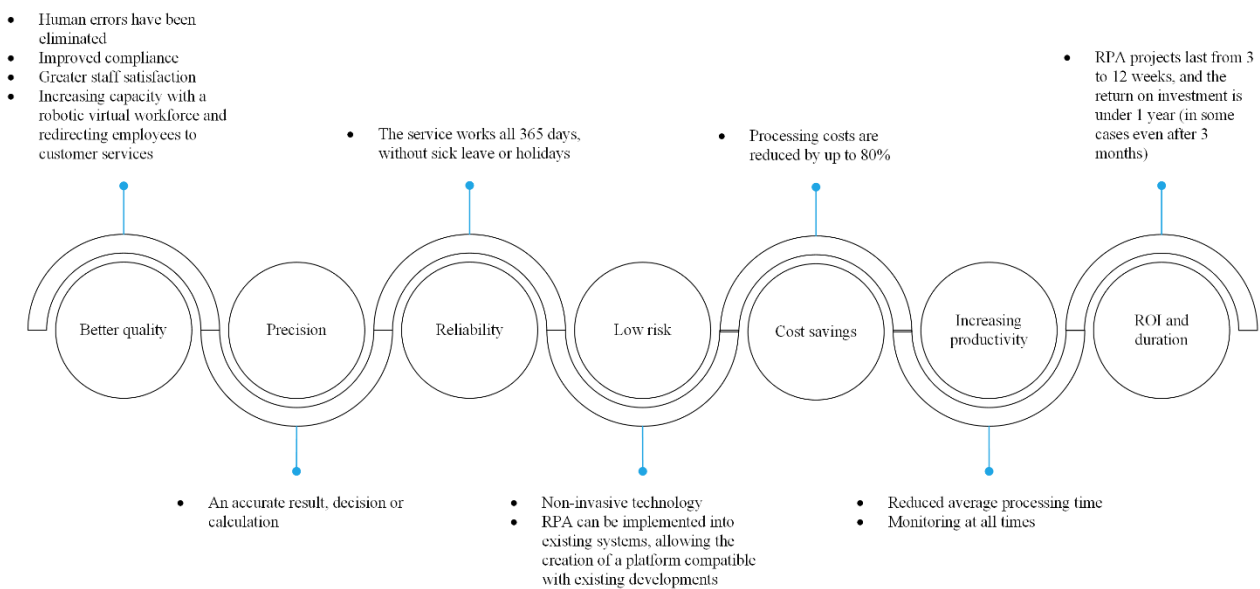
As robots mimic the user's work on the computer, they are ideal for solving monotonous tasks. They interact with other systems the way humans do - through a user interface, only in a much more efficient manner (Kanakov & Prokhorov, 2020). Therefore, they can be integrated with almost all software that people use, and no new

infrastructure investment is needed (Lievano Martinez & Fernandez Ledesma, 2022; Met et al., 2020). Furthermore, the technology is easily scalable, so additional robots can be implemented quite easily (Kanakov & Prokhorov, 2020; Villar & Khan, 2021).

The use of RPA does not require optimization and reengineering of the process being automated. RPA tools vendors strive to make them intuitive to use so that cross-departmental employees are able to develop them themselves with little or no support from IT (Sobczak, 2021). In answer to the second research question, the impact of automation on existing processes and IT infrastructure will be discussed in greater detail.

With all the above benefits, it can be concluded that this technology offers a colossal return on investment (Choi et al., 2021) which refers to a metric used to evaluate the profitability of an investment by comparing the net gain to the initial cost, helping organizations assess the financial effectiveness of their decisions. All of the above can be displayed schematically for systematization (Figure 4).

Figure 4. Advantages of robotic process automation



Source: Authors

In spite of its growing popularity, rapid growth, and high expectations, RPA technology faces several challenges (Herm et al., 2022). The main limitation of developed robots is that they can only perform routine tasks and make decisions based on explicit rules (Huang & Vasarhelyi, 2019). Robots cannot replace humans if creative thinking is required (Maček et al., 2020).

In terms of the implementation itself, the biggest challenges are efficient decision-making about which activities are suitable for automation and determining the number of robots needed (Choi et al., 2021). Software robots require a paid license to operate, but the costs tend to minimize their number (Benkalai et al., 2020; Séguin et al., 2021). Since robotic process automation utilizes

exclusively digital data, its conversion to digital format is not always profitable (Huang & Vasarhelyi, 2019).

Despite the potential for improving service quality with RPA, some worry that robots will replace humans in the future (Lacurezeanu et al., 2020). Employees are often afraid of losing their job, have a hard time learning about the application of new technology, are satisfied with their jobs, and are hesitant to change their processes (Fernandez & Aman, 2018). Resistance to automation is also mentioned by Gotthardt et al., (2020) as a result of employees' fear that automation will negatively affect their current positions. As organizations introduce robots to employees, it is important to ensure they understand that the innovations are not intended to create competition

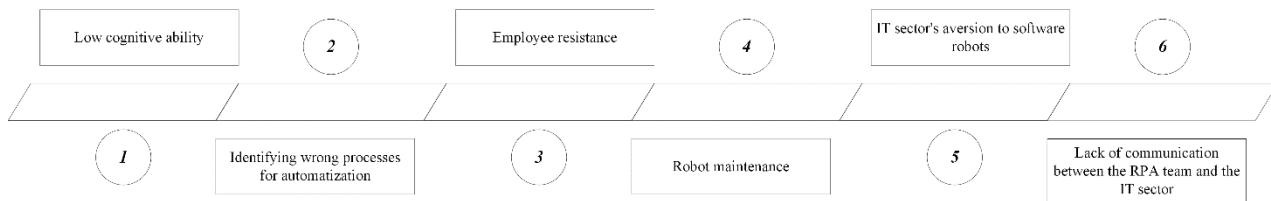
between humans and robots, but instead help the employees accomplish their duties.

As it communicates with other systems through the user interface, one of the main issues is the maintenance of developed robots when the existing software is changed. Existing robots must be reconfigured whenever their user interface is updated. Therefore, a lack of communication between IT and RPA can cause problems in the functioning of software robots, so monitoring and

controlling mechanisms should be implemented (Iden, 2017; Villar & Khan, 2021).

Iden, (2017) discusses the IT sector's aversion toward implemented robots, which are considered a temporary solution instead of an IT solution, since robot development does not require the knowledge and skills of programmers. A summary of RPA's disadvantages is shown in Figure 5.

Figure 5. Disadvantages of RPA



Source: Authors

3.2. Research question 2: Does robotic process automation require significant changes to existing IT infrastructure and business processes?

It should be clear by now that RPA refers to software that mimics the behaviour of people interacting with information systems (Jimenez-Ramirez et al., 2019). Since it is a tool intended for the automation of business processes, RPA project management can be defined as a combination of information technology management and business process management. IT management focuses on developing strategies to achieve business goals through technology, whereas business process management covers a broader scope, as the management approach focuses on managing business initiatives (Villar & Khan, 2021).

Successful automation of a business process is not possible without its prior analysis. Therefore, the concept of business process management and its life cycle steps play a crucial role in the success of an automation project. Dumas et al., (2013) consider the identification and analysis of business processes the first two, and at the same time, the most crucial steps. Analysing tasks performed by employees as part of the business process involves observing their behaviour and/or analysing process documentation (Chakraborti et al., 2020). These two steps form the backbone of the decision to initiate the implementation of the RPA project. Financial institutions and other institutions can only decide where to implement RPA after assessing business processes (Kedziora & Penttinen, 2021).

Literature has not yet reached consensus on the need to redesign the business process for the successful implementation of the automation project. Authors such as Herm et al., (2022) and Met et al., (2020) argue that the implementation of robots does not require a redesign of the business process, but simply replaces people in doing their jobs. In contrast, Fernandez & Aman (2018) contend that RPA requires changes in work, that these changes are common and must be faced by all organizations. As far as

the opinion that can be classified between these two is concerned, changing processes and their structure is not necessary, though it is recommended (Sobczak, 2021).

Herm et al., (2022) conducted workshops that found companies prefer automating existing tasks rather than optimizing them for software robots. In spite of its drawbacks, rapid implementation would otherwise be impossible.

According to the literature, there are two main categories within information technology: lightweight and heavyweight IT (Choi et al., 2021). Lightweight IT operates at the presentation layer and requires stable interfaces to existing software, whereas heavyweight IT is desirable in a stable system architecture (Penttinen et al., 2018).

In order to implement traditional information technologies, existing systems must be modified. On the other hand, RPA, as one of the lightweight information technologies, automates existing manual processes through the presentation layer using available technologies, rather than interfering with existing IT systems (Bygstad, 2017; Huang & Vasarhelyi, 2019).

Employees perform several steps through the user interface to accomplish a particular task. There are basically two types of actions that can be performed through the user interface: mouse click to switch screens and/or keyboard input (Choi et al., 2021). Instead of deep integration with the code of existing applications, the system or the database behind those applications (Chakraborti et al., 2020), RPA is a software solution that integrates into an organization's existing IT infrastructure and automates a wide range of redundant tasks without the need to redesign them (Lacurezeanu et al., 2020).

Accordingly, the main difference between integration through the presentation layer and other methods is that the existing system functionalities are utilized without

requiring any changes to the system logic or interface (Penttinen et al., 2018). Therefore, it is primarily a business venture that pertains to business rules, which implies that an expert in business processes is needed to execute such a project (Sobczak, 2021). Often, the IT department only provides the RPA platform, while the entire implementation process can be completed without their involvement (Herm et al., 2022; Kedziora & Penttinen, 2021).

4. Conclusion

Financial institutions cannot ignore financial technologies in today's era of digitalization, and they will undoubtedly continue to be an important component in efforts to achieve positive changes. Organizations should seriously consider automating their operations because of the benefits derived in terms of speed, cost, quality, accuracy, and reliability. In addition to potential drawbacks and risks, software robots used by major financial institutions around the world demonstrate that good preparation and analysis can significantly reduce their negative effects. As a result of analysing existing business processes and technologies, a decision should be made on the feasibility and success of implementing software robots.

Generally, when employees are not properly informed about robots and their roles, they are averse to automation of their work tasks due to fear of losing their job. Although RPA technology belongs to the category of non-invasive technology that does not require changing the existing IT infrastructure, but communicates with available systems via the presentation layer, i.e., user interface, it is often difficult to introduce this technology in everyday business due to the lack of support from the IT sector. Most often, the IT sector is an obstacle because it has a frivolous understanding of this technology, which is a no-code/low-code solution. Therefore, further research should include identifying all the roles and competencies of employees necessary for the successful development, implementation and maintenance of RPA solutions.

In spite of the literature recognizing the importance of business process management and information technology management for RPA projects, there does not seem to be any clear connection between these concepts that could be used to define the framework for digital business transformation through the use of robotic process automation, which indicates a potential area for future research.

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