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RISKS ASSOCIATED WITH ROBOTIC PROCESS AUTOMATION

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Abstract: *Background: Companies follow new trends to keep up with changes and find better ways of doing business. As one of the latest technologies, Robotic Process Automation (RPA) is in line with the automation trend that has become more prevalent in the 21st century. Since this technology is relatively new, many questions remain unanswered and have not been adequately addressed. Robotic process automation is under-researched in terms of risks that may arise during its development, implementation, or use. Purpose: The aim of this paper is to identify potential risks that may arise during the development, implementation, and use of the Robotic Process Automation. Research design/methodology/approach: Using Web of Science and SCOPUS index databases, a systematic review of the literature was conducted to answer the research question and achieve the defined goal. Results/conclusions: According to the results of the systematic literature review, Robotic Process Automation poses not only the typical risks associated with implementing any technology but also risks that are specific to this technology. Limitations/future research: Identified limitations refer to a small number of papers addressing the risks associated with robotic process automation. Furthermore, it is proposed that future research should include additional bases of studies.*

Keywords: *robotic process automation, risk management, risk assessment, risk*

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1. Introduction

Digital transformation of business has greatly contributed to changes in the way organizations function in the past few years, and this trend will likely continue. Market diversification and changing demands continuously encourage companies to react and adapt quickly (Kocsi et al., 2020). Furthermore, the beginning of 2020 and the outbreak of the pandemic, which greatly affected existing business practices, should not be overlooked (Qasim et al., 2022).

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There are different aspects to observing the digital transformation of business. Changes in employee competencies, the creation of new jobs, changes in management style, and redesign of business processes can all be listed here. Technology and technological innovations, however, are often used to observe the digital transformation of business. Due to their rapid development and increasing availability, they will undoubtedly have a greater impact in the future than they do now (Kirchmer & Franz, 2019). Innovations like Artificial Intelligence, Machine Learning, Internet of Things, Big Data and Cloud Computing drive profound changes in the way organizations work, forming the basis of Industry 4.0 (Kocsi et al., 2020; Saukkonen et al., 2019) and the current digital age. Robots and automation, however, are vital to the digital transformation of businesses in the 21st century (Siderska, 2020). As a result, the list of mentioned innovations would be incomplete without robotic process automation (RPA) technology.

Information systems today tend to be open to make it as easy as possible to communicate with other software solutions already used by businesses. However, in practice, the company's existing software solutions tend to be heterogeneous and technologically complex, making integration with other systems difficult (Torkhani et al., 2019, Author). Therefore, researchers from the academic community and the industry have increasingly been focusing on robotic process automation technology in recent years. In a similar way to human interaction, it automates tasks through software components that interact with existing company systems through a user interface (Jiménez-Ramírez et al., 2020).

This approach to automation enables partial or complete automation of business processes that are manual, repetitive and based on clearly defined rules (Matonya et al., 2020). This technology aims to minimize and control the costs and time needed to implement business activities, which, along with reducing the effort spent for manual tasks, will demonstrate an improvement in the quality of service provided (Torkhani et al., 2019).

Robotic process automation technology has already been implemented in various business sectors. Not only is it adopted in corporations and the private sector, but also in national institutions and public sectors such as education, finance, medicine, environment, security, etc. (Yoon, 2020). Each technology, however, poses numerous questions and risks. RPA tools are associated with numerous risks due to the fact that robotic automation of business is still a relatively new technology and many companies lack experience in this area (Sobczak, 2022). Furthermore, speaking from the perspective of financial robots, Li (2020) asserts that there is a severe lack of theoretical and practical research on the risks associated with software robots that are developed using robotic process automation. Considering the lack of research on robotic process automation, this paper's goal is to identify the risks that may arise during the development, implementation, and use of the RPA. A systematic literature review was conducted to achieve the defined goal.

This paper is structured as follows: After the introduction, the methodological approach used in the research is described. A summary of research results and an answer to the research question are presented in the third chapter, while conclusions are presented in the final section.

2. Methodology

This research was carried out in accordance with the guidelines defined by Barbara Kitchenham (2004). Her research approach consists of three main phases:

- Planning the review,
- Conducting the review, and
- Reporting the review.

For easier systematization, the methodology is presented in Figure 1.

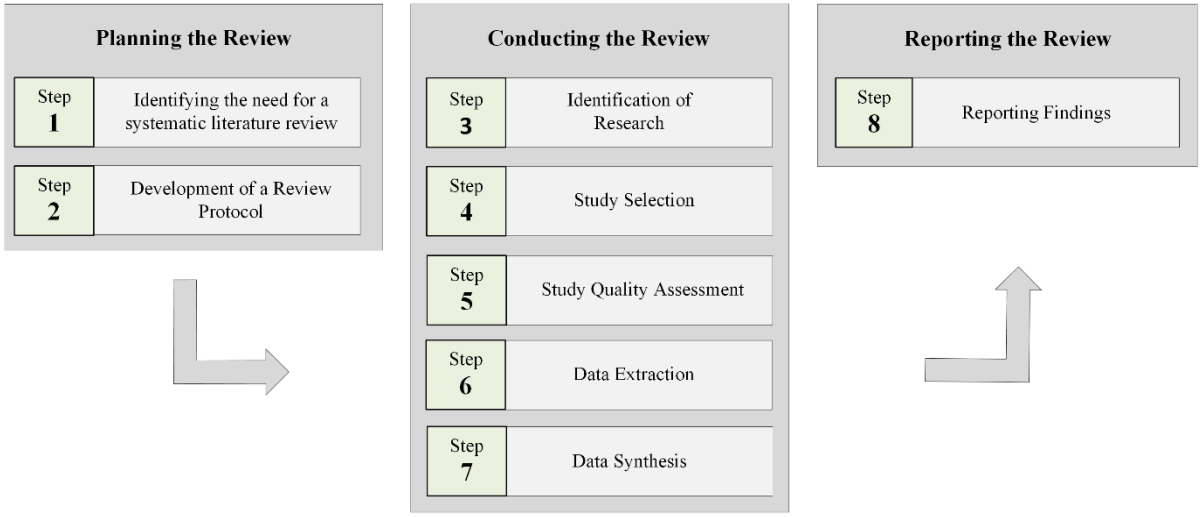


Figure 1: Research methodology
Source: Authors

2.1. Planning the research

Planning represents the first phase of the research methodology and involves making the necessary decisions to ensure the research is successful. Decisions that need to be made include:

- defining research questions and objectives,
- defining search keywords,
- defining databases to be searched,
- defining inclusion and exclusion criteria, and
- defining criteria for evaluating the quality of papers.

All other research activities were based on the following research question:

RQ.1. What risks may companies encounter during the implementation of the project and the use of robotic process automation?

The general objective of this research is to gain an understanding of robotic process automation technology. The following specific research objective was established based on defined research question and general research objective:

O.1. Identify risks that may arise during the development, implementation and use of software robots developed using robotic process automation technology.

The keywords to be used in search for appropriate papers were determined after the research question and objective were defined. "Robotic process automation", "risk management", "risk assessment" and "risk" form a set of selected keywords used to search the databases of papers: Web of Science (WoS) and SCOPUS. Those are the two most cited and largest databases (Raković et al., 2022). Different combinations of keywords were used during the search of selected index databases. Table 1 shows the used combinations of keywords and the number of hits.

Table 1. Combination of keywords and the number of hits

Keywords	Number of hits (WoS)	Number of hits (Scopus)
"robotic process automation" AND "risk management"	2	12
"robotic process automation" AND "risk assessment"	1	9
"robotic process automation" AND "risk"	18	57
Total	**21**	**78**

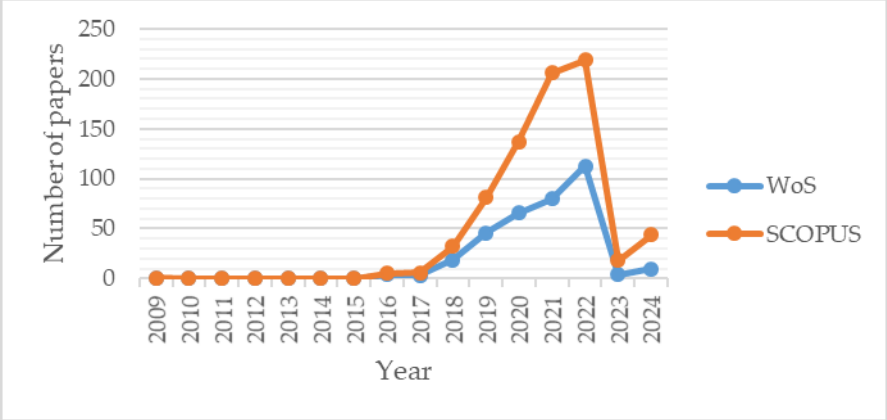
Source: Authors

In order to minimize or eliminate subjectivity, and ensure that only papers whose content matches the purpose of the research are read, the next step involved determining the inclusion and exclusion criteria. These criteria are divided into two groups:

1. criteria based on bibliometric data, where papers that were excluded from further analysis:
    a. are not written in English,
    b. do not address robotic process automation technology.

According to Graph 1, robotic process automation is a relatively new technology and has only appeared in academic research in the last decade. As a result, time was not considered as a criterion for excluding papers from further analysis.

2. criteria based on publication's title and abstract - all papers obtained by searching the selected databases of papers were evaluated by reading their title and abstract. This procedure resulted in a set of papers that were deemed acceptable for further analysis. These papers were downloaded in their entirety, duplicates were removed, and the papers were evaluated within the context of the defined research objective.



Graph 1. The number of publications on the topic of "Robotic process automation"
Source: Authors

For organizing articles and later referencing, Mendeley software was used throughout the entire research process.

2.2. Conducting the research

This phase included searching the database of papers, selecting publications relevant to achieving the research goal, as well as answering the defined research question, eliminating duplicates and analysing the selected papers. The final list of papers was subjected to data extraction and synthesis. Out of 99 hits, 34 papers were analysed in detail. There were 22 duplicates eliminated. The majority of papers were eliminated because they focused on other aspects of robotic process automation technology rather than risks (17 papers). A total of 13 hits were eliminated since they represented the entire conference edition. In 8 papers, the full texts were not available or the authors did not consent to their reading and, therefore, their use in studies. Based on the subjective assessment of the authors, 5 papers were eliminated from further analysis. Having read the entire papers, 3 more papers were eliminated from the final set, resulting in 31 papers being used for this research.

3. Research Results

This section describes the results of the research and answers the defined research question.

3.1. Robotic process automation

Robotic process automation is most frequently associated with a physical robot automating production processes, but despite its name, this technology has nothing to do with robots (Harrast, 2020; Siderska, 2020). Over time, robots that automated production steps have evolved to automate business processes (Kirchmer & Franz, 2019), so the name of this technology contains three key terms (Kocsi et al., 2020):

- robot: implying a software that imitates human activities,
- process: a series of steps that make up some meaningful activity, and
- automation: a process performed by a robot without human intervention.

By using this technology, computer software or "robots" can be configured to interact with existing company systems (Morrison, 2019). Ågnes (2022) states that the tasks of developed software robots include interaction with different systems in order to automate defined tasks. However, it should be borne in mind that robotic process automation technology cannot replace humans in all business processes.

Automation is ideally suited to activities like collecting, entering and copying data that often consume a large portion of an employee's time (Harrast, 2020). Besides being manual and repetitive, such tasks do not require expert knowledge of people or complex decision-making, which makes them suitable for automation with RPA. Developed robots lack cognitive skills (Siderska, 2020) and can make only simple decisions. In a similar way to humans, they use the user interface to access the company's existing systems (Chacon Montero et al., 2019). As a result, robotic process automation projects should start with processes that are stable (Harrast, 2020) and do not change often. As robotic process automation technology has evolved, tasks that were previously considered impossible to automate have now become possible.

The literature distinguishes between several types of robotic process automation. RPA tool vendors are constantly striving to redefine this technology in order to stand out in the market. Villar & Khan (2021) define 4 stages of robotic process automation development (Figure 2.):

- Assisted RPA or RPA 1.0,
- Unassisted RPA or RPA 2.0,
- Autonomous RPA or RPA 3.0, and
- Cognitive RPA or RPA 4.0.

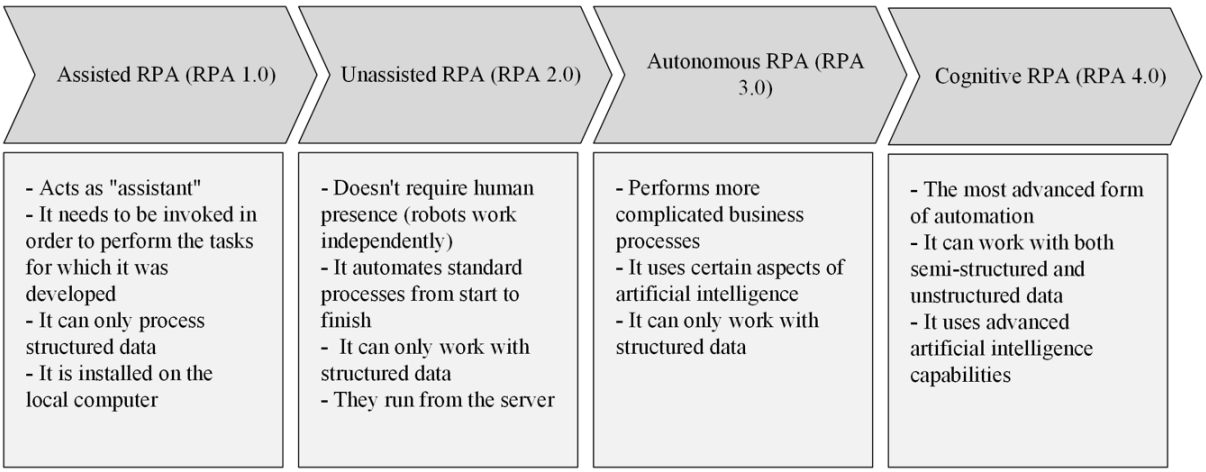


Figure 2. Types of robotic process automation

Source: Authors

The aforementioned division was implemented according to RPA's role in automating processes. During the first type of automation, people have to be present when performing tasks, and it acts as an "assistant" that needs to be called upon to perform certain tasks. RPA 2.0, however, implies automating activities that do not require supervision by humans. In this case, the developed software robots work independently of humans, so it is necessary to automate only those processes that have a minimal number of exceptions and which process structured data only. With RPA 3.0, automation is taken to a higher level by incorporating artificial intelligence to handle more complex tasks. The last stage in the development and the most advanced form of robotic process automation is cognitive RPA, which uses advanced artificial intelligence capabilities to allow a robot to learn independently over time. The digital workforce of this type can process semi-structured and unstructured data.

3.2. Potential risks in the robotic process automation projects

The advantages of robotic process automation for companies include cost reductions and quality improvements. The development of these tools has progressed significantly in recent years, but a lack of information regarding savings, risk management, and quality improvement has created numerous challenges (Morrison, 2019). Hence, during software robot development, implementation, and later use, risks must be considered and managed continuously. Bedi et al. (2020) state that today's industries are focused not only on detecting risks early, but also on eliminating them quickly. Furthermore, Morrison (2019) points out that risk management and the decision to accept or reject RPA technology should always be outlined in the hierarchy of decision-making.

There is no generally accepted definition of the term "risk" in business research. However, most of the literature agreed on its three building elements: probability, future, and adverse outcome (Qasim et al., 2022). In the analysed literature, only a few papers discuss the risks associated with robotic process automation. Most of these papers address the features, advantages or disadvantages of RPA, processes that are suitable for automation, or case studies that focus on a specific company or business sector. To fill in the identified gap, the results of the research will be presented in the following sections by answering the research question.

In his research, Sobczak (2022) classified potential risks associated with RPA implementation into universal and specific risks. The specific risks include only those associated with software robots developed using robotic process automation. The universal risks, on the other hand, may also arise from traditional automation methods. According to Sobczak, the most significant risks in the implementation of the robotic process automation project include:

- wrong perception of the robotic process automation by employees,
- wrong approach to the RPA project implementation,
- wrong choice of tools during the software robot development,
- inadequate approach to change management in the processes being automated,
- resistance of the employees involved in the processes intended to be automated, and
- loss of competences and knowledge of the processes being automated.

Bedi et al. (2020) state that industries have a strong interest in improving risk management. They view robotic automation technology alongside artificial intelligence and list the following types of risk management:

- strategic risk management,
- regulatory risk compliance and management,
- operational risk management,
- technological risk management, and
- financial risk management.

According to Deloitte (2020), there are also some very important risks associated with the implementation and use of robotic process automation. Their classification, on the one hand, contains the risks inherent in the robotic process automation technology, and on the other hand, the risks related to business processes that are automated (Figure 3.).

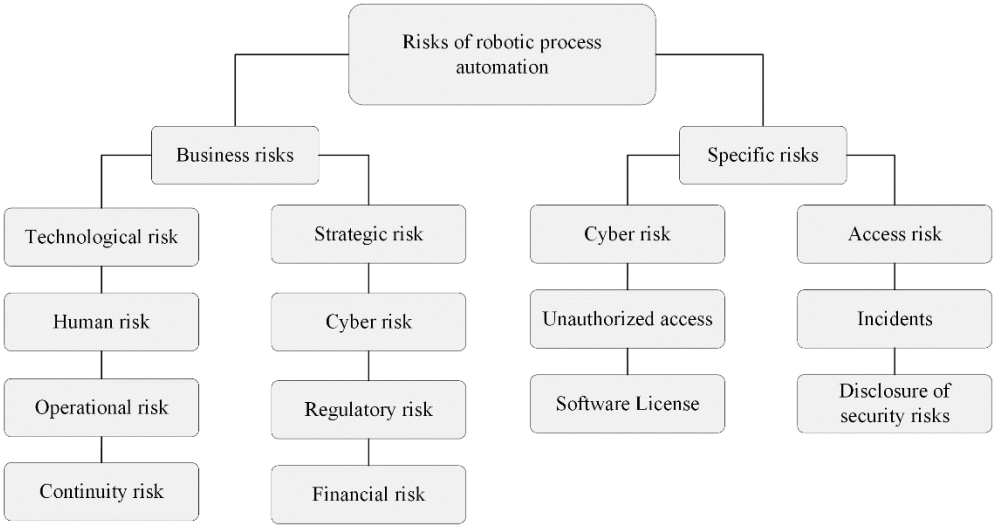


Figure 3. Risks of robotic process automation
Source: Deloitte (2020)

Many organizations do not realize the full potential of robotic process automation. Without a proper automation strategy, implementing an RPA robot driven solely by business requirements can pose significant challenges (Kirchmer & Franz, 2019). An important aspect is that robotic process automation is a combination of information technology management and business process management. While information technology management focuses on developing strategies to achieve business goals through technology, business process management covers a broader scope, as the management approach focuses on managing business initiatives (Villar & Khan, 2021). Consequently, successful automation of business processes requires their prior analysis, so the life cycle of a robotic process automation project begins with an analysis of potential automation targets (Jimenez-Ramirez et al., 2019). In practice, this phase of the analysis often involves significant time and effort spent on reviewing incomplete or inaccurate process documentation. In many cases, it depicts scenarios that never take place or that do not reflect reality. Furthermore, the cases that are documented sometimes do not occur. Therefore, introducing a robot designed on an unstable basis into everyday business carries a high risk (Jimenez-Ramirez et al., 2019). Understanding the RPA process and IT context is essential for achieving success and maximizing its potential (Kirchmer & Franz, 2019).

Technological aspect of robotic process automation is certainly one of the most significant risks. It consists of several challenges. To begin with, a large majority of companies that develop tools for robotic process automation only offer solutions for Windows, not MAC OS or Linux (Morrison, 2019). The fact that almost all companies use the Windows operating system should make this limitation less of a problem in practice. According to Huang & Vasarhelyi (2019), a limitation of software robots, in contrast, is that they can only perform routine tasks without making complex decisions, but only based on explicitly defined rules. Human creative thinking cannot be replicated by robots (Maček et al., 2020).

Although robots can handle heavy workloads and work 24/7, robotic process automation technology is not without external risks, such as changes in laws and security attacks, that can prevent software robots from successfully completing tasks (Jimenez-Ramirez et al., 2019; Morrison, 2019). Modliński et al. (2022) suggest there might be situations in which existing processes or tasks need to be modified, which in turn may result in software robots being withdrawn from service altogether.

There are numerous security issues and challenges associated with robotic process automation, as with any other technology. A software robot can perform its tasks successfully for a long period of time and then suddenly stop working. Various factors can lead to this situation, including human errors, coding problems, or system hacking. According to Modliński et al. (2022), the lack of experts and/or the cost of eliminating a robot's failure may lead to the removal of robots from use, as a result of a loss of money invested in the development, testing and implementation of robots. A constant exposure to potential attacks and misuse of data requires constant monitoring to eliminate errors and damage. Cyber attackers can use malware to gain unauthorized access to robots and sensitive user data and information. Bots are smart, but they do not recognize intent, so detecting security risks can be challenging (Baraković & Baraković Husić, 2022).

When software robots are implemented, they have their own access identities, and if employees initiate their work, it is at risk that unauthorized individuals could access functions and data. Furthermore, in practice, software robots can also be developed with privileged access, meaning people with access to them can abuse their position and acquire robot's authorizations. Despite the fact that proper configuration and use can mitigate these risks, the robotic process automation software vendors are aware of the potential risks and the need for their control. Therefore, the process for determining a robot's appropriate authorization during the implementation of a robotic process automation project needs to be clearly defined in order to ensure the security of sensitive data (Harrast, 2020).

In business processes, robotic process automation reduces or minimizes the role of the human factor (Morrison, 2019). On the other hand, when it comes to how employees might react to potential automation of their work, Ågnes (2022) points out that neither can current research confirm nor challenge only one viewpoint. Lacurezeanu et al. (2020) state that despite all the benefits, employees have a great fear of being replaced by robots. The majority of employees fear losing their jobs, have difficulty learning how to apply new technology, are satisfied with their jobs, and are hesitant to change their practices (Fernandez & Aman, 2018). Modliński et al. (2022) add that there is a possibility of employees resisting RPA due to a lack of awareness and a fear of losing their jobs. However, there is no intention to fire employees as a result of the use of software robots. The activities that require human intelligence, such as negotiation, persuasion, creativity, generating ideas, understanding complex patterns, are difficult to replace with robots (Yoon, 2020). The employees whose jobs can be automated should be redirected to other activities that require human interaction and cannot be automated.

Just like industrial robots, the robots developed using robotic process automation technology automate human activities, including those involving the use of existing company information systems. There are basically two types of actions that can be performed through user interfaces: mouse clicks to switch screens and/or keyboard input (Choi et al., 2021). The automation of these activities can be achieved with relatively small investments, which makes RPA all the more attractive to organizations. In addition to deciding which activities are suitable for automation, determining the number of robots needed is another challenge (Choi et al., 2021). Activities are assigned to robots for execution and take a certain amount of time to be completed (Séguin et al., 2021). The license for each software robot must be paid, and

companies strive to keep the number of robots to a minimum in order to minimize costs (Benkalai et al., 2020; Séguin et al., 2021). From a financial perspective, robotic process automation works exclusively with data in digital form, and it may not always be profitable to convert data into digital format (Huang & Vasarhelyi, 2019). Recent statistics indicate that 30-50% of RPA initiatives fail due to a lack of understanding of robotic process automation (Kirchmer, 2017).

4. Conclusion

Robotic process automation offers various benefits such as increased efficiency, cost reduction, and improved accuracy in performing business tasks. However, the implementation of RPA is not without risks.

The objective of this research was familiarization with the technology of robotic process automation, with particular emphasis on the risks that might occur during and after the implementation of the RPA project. To achieve the set objective, a systematic review was conducted according to Barbara Kitchenham's directions in order to perform a theoretical analysis of the papers (2004).

Risks are commonly categorized in the literature into those typical for any technology implementation and those specific to this technology. There are numerous risks that can contribute to the failure of implementation or subsequent use of RPA technology, including technological risks, human factor, financial risks, and risks of automating business processes that are not suitable for automation. Therefore, the implementation of software robots requires not only the possession of technical but also business knowledge and skills in order to understand and encompass the entire environment for the implementation.

Even though the literature recognizes the potential of robotic process automation, the main limitation during this research was a small number of studies that addressed the risks associated with RPA. Therefore, future research should include additional sources of publications.

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