# THE APPLICATION OF ROBOTIC PROCESS AUTOMATION IN THE FIELD OF ACCOUNTING: A LITERATURE STUDY

**Muhammad Nur[1], Dhieka Avrilia Lantana[2], Erwin Indriyanto[3], Kumba Digdowiseiso[4], Hafiza Aishah Hashim[5]**

[1,2,3,4]Faculty of Economics and Business, Universitas Nasional Jakarta;
[5]Faculty of Business, Economics and Social Development, Universiti Malaysia Terengganu
*Corresponding email: kumba.digdo@civitas.unas.ac.id

## Abstract

Accounting seeks to facilitate the process of financial managers gathering financial records, categorizing financial elements, identifying patterns in financial transactions, and conveying financial circumstances. Originally, accounting was performed manually by individuals, but with advancements in technology, robotic process automation (RPA) emerged as a method for carrying out accounting tasks. This implementation has a beneficial effect on the company, resulting in enhanced performance and efficiency. Nevertheless, it has the capacity to generate employment issues. Hence, a comprehensive investigation is required to explore the utilization of robotic process automation in the domain of accounting. The approach employed is a rigorous systematic literature review utilizing scientific publications. The scientific literature utilized must adhere to the specified criteria. The data analysis employs a descriptive and argumentative methodology. The findings indicate that the presence of RPA does not have a substantial capacity to substitute for human involvement. In reality, RPA merely eliminates human tasks, thereby allowing humans to allocate their time towards enhancing more accurate decision-making processes. Occupations within the accounting sector that can benefit from the implementation of RPA encompass bookkeeper, financial accountant, controller (management accountant), business data analyst, treasurer and risk manager, and financial systems and process manager.

**Keywords**: *accounting, implementation, robotic process automation*

## 1. INTRODUCTION

The objective of accounting is to facilitate the process of financial managers in gathering financial records, categorizing financial elements, identifying patterns in financial transactions, and conveying financial circumstances. Hence, accounting is extensively utilized in diverse companies and institutions. Financial reports are the primary outcome generated by the accounting process. These will be utilized by both internal and external stakeholders to assess the financial state. Internal parties typically encompass the owners, managers, and employees of companies and institutions. On the other hand, external parties include the government, capital borrowers or creditors, investors, consumers, and tax authorities. The management process necessitates human resources with the requisite capacity and capability. The accounting profession contributes to the optimization of accounting practices, as highlighted in a study by Hifni et al. (2020). The study emphasizes that the accounting profession assists companies in attaining sustainable development through effective reporting and measurement techniques. Furthermore, the accounting system within a company or institution encompasses components such as accounts, transactions, recording, and reporting. The integration of an accounting system within a company is intricately linked to the accounting information system. This correlation is substantiated by a study conducted by Hasanah & Siregar (2021), which revealed a significant impact of the accounting information system on the overall quality of the financial reports generated.

*THE APPLICATION OF ROBOTIC PROCESS AUTOMATION IN THE FIELD OF ACCOUNTING: A LITERATURE STUDY*

*Muhammad Nur, Dhieka Avrilia Lantana, Erwin Indriyanto, Kumba Digdowiseiso, Hafiza Aishah Hashim*

Accounting systems can be distinguished by their temporal perspective and level of sophistication. These can be categorized into two types: traditional or conventional and modern, based on their temporal perspective. Traditional or conventional accounting relies on the manual input, classification, storage, processing, and presentation of accounting data and information. Modern accounting, in contrast to traditional methods, utilizes computer devices that offer efficiency, flexibility, and data security to ensure the preservation of financial information. Computer peripherals, including scanners, mice, keyboards, and touchpads, can be used to input data (Akadiati et al., 2022). Additionally, the utilization of artificial intelligence can be incorporated in the processing of contemporary accounting information systems. Artificial Intelligence (AI) has demonstrated its ability to enhance the efficiency of routine accounting tasks, improve the accuracy of financial reports through thorough data analysis, and enhance decision-making by enabling accurate predictions (Yusuf, 2023). Contemporary accounting systems can also cater to the requirements of a company's financial data security system. An effective approach to enhancing the securities system involves implementing a system development life cycle (SDLC) utilizing the waterfall method, as demonstrated in Sururi's research (2022).

Modern accounting information systems offer several advantages that cannot be fully utilized by traditional accounting systems. The reason for this is that manual recording necessitates the use of numerous sheets of paper and data entry must be performed individually, resulting in a significant amount of time being consumed. Conversely, relying solely on physical recording methods is also less secure against the risks of disasters and data breaches. Robotic Process Automation (RPA) is an advanced and sophisticated technological revolution that automates tasks. This system has the capability to automatically execute task instructions by utilizing variables that have been established by the developer. The underlying system of the software for robots and artificial intelligence workers has the capability to enhance performance and execute tasks with greater precision and repetition (Ribeiro et al., 2021). As stated by Siderska (2020), automated software robots have the capability to perform various tasks such as generating reports, entering and analyzing data, validating migration and replication, processing and managing data storage, updating transaction systems, serving as operational tools for sales activities, boosting revenue, extracting data, and adding to databases. Organizations can derive additional advantages from implementing Robotic Process Automation (RPA), such as enhancing operational workflows, reducing errors, achieving precise measurements, and generating improved accounting reports (Kokina & Blanchette, 2019). In addition to its benefits, the implementation of RPA in various industries is gradually diminishing the demand for human resources in companies and organizations.,This situation has the capacity to lead to employment difficulties, particularly within the accounting field.

Given the benefits and possible challenges associated with RPA in accounting, it is evident that a comprehensive study is required to evaluate the adoption of RPA in the accounting domain. This is done to provide readers with a clear understanding of the level of robotic process automation (RPA) implementation in the accounting field. The purpose is to effectively analyze the implementation of RPA and identify the key factors that influence its implementation. Additionally, this application can offer guidance to readers regarding the future trajectory of employment trends in the accounting field. Hence, the objective of this study is to elucidate the utilization of robotic process automation in the domain of accounting through an analysis of existing literature. An extensive literature review was conducted to examine the multifaceted implementation of Robotic Process Automation (RPA) in the accounting domain.

## 2. RESEARCH METHODS

The aim of this research, which is to examine the application of robotic processes based on various perspectives, is the basis for selecting data collection methods based on Systematic Literature Review (SLR) in this research. SLR removes scale limitations for researchers to expand information about the implementation of robotic process automation in the accounting field. The

data needed in this research is scientific literature originating from Google Scholar. The scientific literature in question refers to scientific articles or journals, scientific proceedings, and books. The instruments used in this research are contained in table 1.

Table 1. Research instruments

| No | Software | Utility |
|----|----------|---------|
| 1 | Publish or Perish 8 and Google Scholar | Collect scientific literature in accordance with requirements & sort scientific literature data |
| 2 | Ms. Excel | Tabulation of scientific literature data |
| 3 | Ms. Word | Data analysis is based on a qualitative descriptive approach. |

The data collection process consists of several stages, these stages refer to research by Page et al. (2021) who conducted a Systematic Review and Meta Analysis (PRISMA). The way data collection works using this method begins with a data identification process based on a scientific literature search engine (in this study, Google Scholar was used). The data identification stage is used to review the titles of search results. If the article has been identified, the process of screening articles that meet the requirements continues. These conditions are provisions for scientific articles that can be used for data analysis. These conditions are divided into several indicators listed in table 2.

Table 2. Terms of scientific literature

| No | Indicator | Parameter |
|----|-----------|-----------|
| 1 | Topic | Application of robotic process automation in the accounting field |
| 2 | Text availability | - Text available<br>- Text not available |
| 3 | Relevance to the study topic | Literature is able to answer the topic and research objectives |
| 4 | Level of relevance to the study topic | - The literature examines the application of robotic process automation in general (partially related).<br>- Literature examines the application of robotic process automation in the accounting field (totally related). |

The final data collection process is included, at this stage the scientific literature most relevant to the topic is selected, the level of relevance is based on number 4, table 2. Then, it continues with the process of analyzing the results of the article findings, which is based on the adoption of research by Ascani et al. (2021). The adoption is reviewed based on several aspects. However, the aspects used in this research are adjusted to the stated research objectives. Modifications to these aspects include the following.
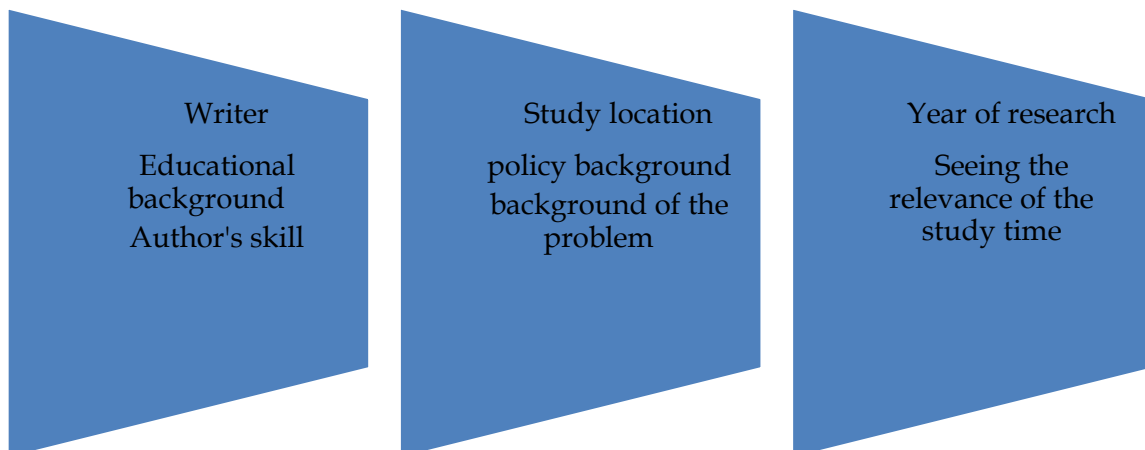
Writer

Educational background
Author's skill

Study location

policy background background of the problem

Year of research

Seeing the relevance of the study time

Figure 1. Basic aspects of data analysis

*THE APPLICATION OF ROBOTIC PROCESS AUTOMATION IN THE FIELD OF ACCOUNTING: A LITERATURE STUDY*

*Muhammad Nur, Dhieka Avrilia Lantana, Erwin Indriyanto, Kumba Digdowiseiso, Hafiza Aishah Hashim*

## 3. RESULTS AND DISCUSSION
### 3.1. Results
### 3.1.1. Application of Robotic Process Automation in the Accounting Field

Based on the results of data collection and analysis, there are 100 scientific literature containing the keywords about "application of robotic process automation" and "accounting". However, of the 100 articles, only 23 articles were most relevant to the research objectives, the rest (77) articles only partially contained keywords. A total of seven articles were published in 2020, which means 30.43% of the 23 articles were published in 2020. This was followed by articles published in 2018 and 2019, which accounted for 21.74% of the types of articles, articles published in 2021 amounted to 17 .39% of articles, and articles published in 2016 and 2017 were 4.35% of articles. A more detailed view of the data is presented in table 3 and figure 2.

Table 3. Number and percentage of articles based on year of publication

|  | **Amount** | **Percentage (%)** |
|---|---|---|
| 2016 | 1 | 4.35 |
| 2017 | 1 | 4.35 |
| 2018 | 5 | 21.74 |
| 2019 | 5 | 21.74 |
| 2020 | 7 | 30.43 |
| 2021 | 4 | 17.39 |
| **Total** | **23** |  |

Source: Author's data processing results (2023)



Figure 2. Percentage of years of scientific literature publication
Source: Author's data processing results (2023)

Furthermore, if we look at the citation matrix, it is known that there are scientific articles that raise the topic of implementation of robotic process automation in the field of accounting has received quite high attention. This is represented by a total of 5002 citations from 23 articles, with an average annual citation of 714, 217 citations per scientific article, and 3 authors per scientific article. The data is shown in table 4.

Table 4. Matrix of scientific article data findings

| Indicator | matricks |
|---|---|
| Scientific articles | 23 |
| Citation | 5002 |
| Citations/year | 714 |
| Citations/articles | 217 |
| Author | 3 |

Source: Author's data processing results (2023)

The locations highlighted in the study are global in nature and seek to review perspectives on the implementation of robotic process automation from various countries and regions. Based on a review of the authors' background, most of the authors have an educational background and expertise that is relevant to the topic raised, so this indicates that the research results written are in accordance with study procedures in the accounting field and minimize bias in interpreting data and information. The authors' educational background and expertise come from the accounting department, business administration, and financial management. The findings show that the implementation study of RPA implementation is divided into study domains. Essentially this domain consists of (1) the use of RPA technology in the accounting field, (2) the roles, actors and tasks in its use of Artificial Intelligence– AI in the accounting field, (3) the impact provided by the use of RPA in the accounting field, this impact includes the influence on the accounting profession, accounting systems and accounting services globally. This influence is visualized in Figure 3.
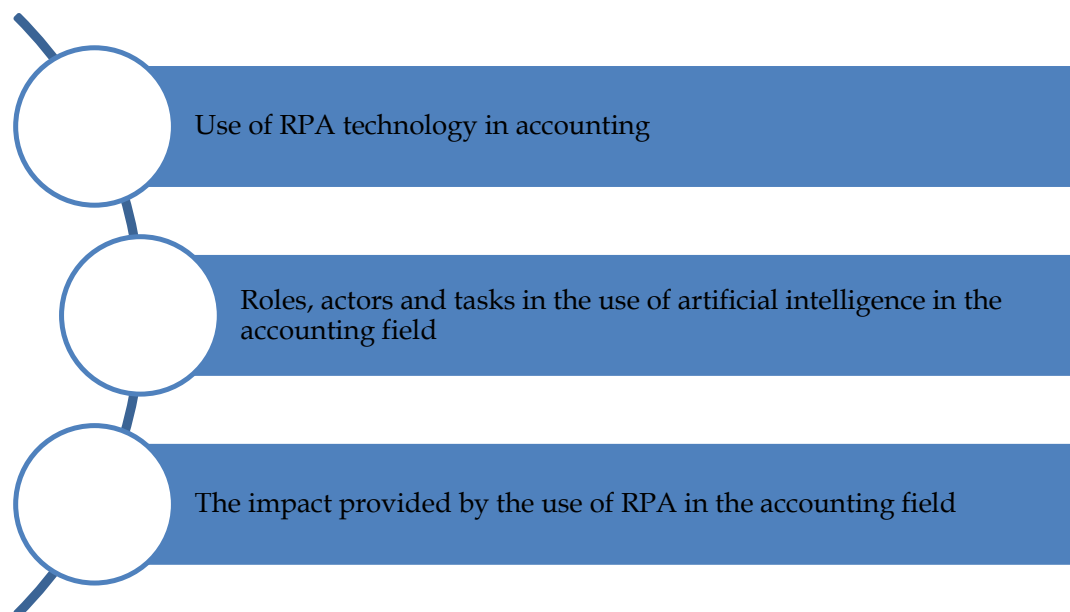


Use of RPA technology in accounting

Roles, actors and tasks in the use of artificial intelligence in the accounting field

The impact provided by the use of RPA in the accounting field

Figure 4. Domain of RPA implementation studies in the accounting field
Source: Author's data processing results (2023)

## 3.2. Discussion
### 3.2.1. Application of Robotic Process Automation in the Accounting Field

The utilization of Robotic Process Automation (RPA) technology within the accounting domain serves as tangible proof of the forward-moving advancements made in accounting information systems. This presents opportunities for accountants to maximize their potential, as the data entry procedure can be completed efficiently and quickly. Artificial intelligence,

*THE APPLICATION OF ROBOTIC PROCESS AUTOMATION IN THE FIELD OF ACCOUNTING: A LITERATURE STUDY*

*Muhammad Nur, Dhieka Avrilia Lantana, Erwin Indriyanto, Kumba Digdowiseiso, Hafiza Aishah Hashim*

particularly RPA, will greatly influence the duties of accountants in the public accounting industry. While RPA has had a beneficial influence on the accounting field, the reaction of each company to its presence varies considerably, depending on the company's size (Bakarich & O'Brien, 2021). The level of public scrutiny regarding the implementation of RPA in the accounting field is evident through the abundance of scholarly publications dedicated to examining this subject. Table 3 reveals that RPA witnessed a rise in the quantity of publications during the years 2018 and 2019. Amidst extensive discussions on machine learning, there was a notable increase in writers' interest to explore the presence of RPA in the accounting field. In 2020, amidst the pandemic, there was a substantial shift from manual systems to digital systems. This is due to government policies that impose restrictions on community activities, which in turn stimulate various sectors, including the accounting sector, to develop innovative solutions for automated and digital operations. The advent of innovation and technological revolution in the accounting domain has effectively captured the interest of scholars who are studying RPA in accounting. The study of RPA implementation in the accounting sector has garnered significant public attention, as evidenced by the total number of citations reaching 5002.

The research conducted by Leitner-Hanetseder et al. (2021) illustrates the functions, participants, and responsibilities of RPA within the accounting domain. The findings demonstrate that the utilization of artificial intelligence (AI), which serves as the foundation for the advancement of RPA, has the potential to supplant human involvement in the execution of repetitive tasks within the accounting domain, such as data recording and aggregation. Moreover, AI serves as a "adjunct" that enhances human decision-making. Essentially, this performance enhances the efficiency and effectiveness of human involvement in the accounting domain. More precisely, the positions that can be substituted by the existence of AI and RPA include the role of a bookkeeper. Over the past decade, this occupation has witnessed a decrease in demand primarily because of the advent of digital technology, which streamlines financial transactions, record-keeping, and documentation. The presence of AI will enhance the efficiency and effectiveness of the financial accountant profession. AI can enhance the role of accountants in assuming responsibility for the tasks and content of financial reports. The existence of AI merely offers support, rather than entirely supplanting the function of accountants, as accountants are indispensable for facilitating communication between parties and resolving intricate problems. As a consultant, the controller profession possesses the capacity to accurately articulate and deduce conclusions. The involvement of AI in this capability will optimize its performance by enhancing focus in the data mining process and generating interactive dashboard visualizations that are supported by big data-driven decisions. Within traditional accounting information systems, business data analysts are responsible for analyzing data using their specialized knowledge and conducting basic descriptive analysis. Nevertheless, utilizing AI empowers business data analysts to identify financial patterns and make decisions with utmost efficiency. The presence of AI will facilitate the optimization of the roles of financial systems, process managers, treasurers, and risk managers.

The impact of implementing accounting, specifically global accounting services, was examined by Fernandez & Aman (2018), Siderska (2020), and Kaya & Turkyilmaz (2019). The discussed impacts are evaluated from both individual and organizational standpoints. The respondents for the individual impact interview consisted of vice presidents, human resources personnel, operational managers, team managers, continuous improvement managers, and operational specialists. These interviews revealed that the inclusion of RPA facilitates the automation of financial data processing, making it systematic, standardized, and ultimately enhancing productivity and value. Nevertheless, RPA technology still necessitates human participation. The decrease in the time required for processing financial data also demonstrates that RPA is a collective endeavor by the company to enhance the efficiency of financial report processing. This efficiency additionally aids in diminishing repetitive tasks. By employing this approach, employees can refine their creative skills and conduct thorough data analysis. There

were concerns raised about the substitution of human resources with RPA. However, some respondents argued that RPA does not actually replace accountants, but rather assists in eliminating manual tasks and enhancing job satisfaction. Organizations also experience a positive impact when utilizing RPA, as it mitigates issues arising from human fallibility, enhances company efficiency, and ensures continuous operation. The RPA also influences the accounting profession. Blockchain is a frequently employed component in RPA that enables centralized storage of information, allowing access to be granted to authorized individuals. All individuals with access to information will also be able to identify any alterations in financial data. Implementing this measure will enhance the dependability of financial data and reduce instances of fraudulent activities (Zhang et al., 2020).

## 4. CONCLUSION

Based on the results of data analysis, it can be inferred that the adoption of robotic process automation can enhance company performance, efficiency, effectiveness, and productivity. The presence of Robotic Process Automation (RPA) does not have the ability to fully substitute humans, as its primary function is to eliminate manual tasks performed by humans. Instead, RPA allows accountants to allocate their time towards enhancing more accurate decision-making processes. Occupations within the accounting sector that can benefit from the implementation of RPA encompass bookkeeper, financial accountant, controller (management accountant), business data analyst, treasurer and risk manager, and financial systems and process manager.

### Acknowledgement

## REFERENCES

Akadiati, VAP, Sinaga, I., & Sumiyati, L. (2022). The Impact of Implementing an Accounting Information System on the Quality of MSME Financial Data During the Pandemic in Bandar Lampung. E-Journal of Accounting, 32(10), 3069. https://doi.org/10.24843/EJA.2022.v32.i10.p12

Ascani, I., Ciccola, R., & Chiucchi, M. S. (2021). A Structured Literature Review about the Role of Management Accountants in Sustainability Accounting and Reporting. Sustainability, 13(4), 2357. https://doi.org/10.3390/su13042357

Bakarich, K. M., & O'Brien, P. E. (2021). The Robots are Coming … But Aren't Here Yet: The Use of Artificial Intelligence Technologies in the Public Accounting Profession. Journal of Emerging Technologies in Accounting, 18(1), 27–43. https://doi.org/10.2308/JETA-19-11-20-47

Fernandez, D & Aman, A. (2018). Impacts of Robotic Process Automation on Global Accounting Services. Asian Journal of Accounting and Governance, 131, 123–131. https://doi.org/http://dx.doi.org/10.17576/AJAG-2018-09-11

Hasanah, S & Siregar, T, R. (2021). The Influence of Implementing Government Accounting Standards, Accounting Information Systems, Internal Control Systems, and Human Resource Competence on the Quality of OPD Financial Reports in Labuhanbatu Regency. Indonesian Journal of Accounting, Finance & Taxation (JAKPI), 9(1). https://jurnal.unimed.ac.id/2012/index.php/eua/article/view/25706

Hifni, S., Sayudi, A., & Hayat, A. (2020). The Role of Sustainability Accounting: Accountability in Ecology, Socio and Economics. Proceedings of the National Seminar on Wetland Environments, 4(2), 404–414.

Kaya, C.T., & Turkyilmaz, M. (2019). Impact of RPA Technologies on Accounting Systems □. January 2021. https://doi.org/10.25095/mufad.536083

Kokina, J., & Blanchette, S. (2019). Early evidence of digital labor in accounting: Innovation with Robotic Process Automation. International Journal of Accounting Information Systems, 35, 100431. https://doi.org/10.1016/j.accinf.2019.100431

Leitner-Hanetseder, S., Lehner, O.M., Eisl, C., & Forstenlechner, C. (2021). A profession in transition: actors, tasks and roles in AI-based accounting. Journal of Applied Accounting Research, 22(3), 539–556. https://doi.org/10.1108/JAAR-10-2020-0201

Page, MJ, McKenzie, JE, Bossuyt, PM, Boutron, I., Hoffmann, TC, Mulrow, CD, Shamseer, L., Tetzlaff, JM, Akl, EA, Brennan, SE, Chou, R., Glanville, J ., Grimshaw, J.M., Hróbjartsson, A., Lalu, M.M., Li, T., Loder, E.W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ, n71. https://doi.org/10.1136/bmj.n71

Ribeiro, J., Lima, R., Eckhardt, T., & Paiva, S. (2021). Robotic Process Automation and Artificial Intelligence in Industry 4.0 – A Literature review. Procedia Computer Science, 181, 51–58. https://doi.org/10.1016/j.procs.2021.01.104

Siderska, J. (2020). Robotic Process Automation — a driver of digital transformation? Engineering Management in Production and Services, 12(2), 21–31. https://doi.org/10.2478/emj-2020-0009

Sururi, R, M. et al. (2022). Design of a Sales Accounting Information System with an Emphasis on Security Systems at PT Thanks to Young People. Journal of Accounting, Taxation and Auditing, 3(1). http://pub.unj.ac.id/index.php/japa/article/view/713

Yusuf, M, F, M. et al. (2023). Integration of Artificial Intelligence Technology in Modern Accounting Systems. Journal of Trends Economics and Accounting Research, 4(1). https://journal.fkpt.org/index.php/jtear/article/view/902

Zhang, Y. (2020). The Impact of Artificial Intelligence and Blockchain on the Accounting Profession. 8, 110461–110477. https://doi.org/10.1109/ACCESS.2020.3000505