# Systematic Literature Review Impact of RPA Implementation on Company Performance

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**Abstract.** This study aims to provide an overview of the impact of the application of Robotic Process Automation (RPA) on the company's business processes on the company's performance. The research method used is Systematic Literature Review. The results of the research show that the implementation of RPA is mostly done in the financial sector. This research is limited to the impact on the company's internal environment from the operational side. This research is expected to be useful for researchers who want to conduct research related to the implementation of RPA in various segments of business processes, as well as information for business actors who want to know about RPA.

**Keywords:** RPA · Robotic · Robotic Automation Process · Company Performance

## 1 Introduction

The world of Information and Communication technology (ICT) is growing rapidly. Currently there is one technology called Robotic Processing Automation (RPA). RPA is a technology that can mimic actions normally performed by humans to interact with digital systems in performing simple and repetitive tasks and business processes [1]. With the RPA, many business process activities can be carried out more efficiently and effectively compared to work done by humans which allows for Human Errors [2].

RPA is one of the technology trends that has successfully changed the way companies work. Ernst & Young conducted a study on the implementation of RPA in companies and found that RPA was successful in transforming the cost, efficiency, and quality of execution of backoffice work processes in completing repetitive tasks. [3]. Some of the research results obtained [4] and [5] stated that success in implementing RPA usually depends on the level of readiness and maturity of the technology owned by the company. [6] also mentions that the consideration needed for companies that want to adopt RPA is a strategy, be it a strategy from a cost perspective, as well as a technical one. [7] is also in line with [6] who stated that the implementation and maintenance costs related to automation should be well considered.

To find out the scope of tasks that can be applied to automation using RPA in connection with the aim of improving company performance, the researchers conducted this systematic literature review study to map the potential implementation and impact

of RPA on company performance from research that has been carried out by previous researchers so that from the results of a systematic review It is hoped that this can be a new idea for conducting more in-depth related research.

## 2  Literature Study

### 2.1  Robotic Process Automation

#### 2.1.1  Definition

Robotic Process Automation according to several previous researchers, namely RPA is a form of business process automation technology that works to automate interactions with end-user GUI desktops [8]; RPA is a technological imitation of human workers with the aim of automating structured tasks in a fast and cost-effective way [9]; RPA is the automation of service tasks that reproduce work performed by humans [10]; RPA is a methodology for performing routine business processes by automating the way people interact, with multiple applications or analytics through a user interface and also by following simple rules for making decisions [11]; RPA is defined as "the automation of processes that mimic human interaction using technology to reduce low-value manual intervention and human touch in an auditable and controllable manner" [12]; RPA is the use of software with artificial intelligence (AI) and machine learning capabilities to handle high-volume repetitive tasks that previously required humans to do [13]; Techniques that result in the automated execution of administrative, scientific or industrial tasks using robotics as "a set of techniques related to the operation and use of automata (robots) in the performance of multiple tasks in place of humans" [14]; An example of preconfigured software that uses predefined business rules and activity choreography to complete autonomous execution of a combination of processes, activities, transactions, and tasks in one or more non-system related software to deliver results or services with exception management human [15]; RPA is a type of software that imitates human activities in carrying out tasks in a process [6]; RPA is a technology that allows computer software to mimic actions normally performed by humans interacting with digital systems to perform simple and repetitive tasks and business processes [1]; RPA is bot software that is trained to run repetitive and time-consuming jobs [3]; specialized software robots that automate high-volume, repetitive, rules-based tasks in an auditable and reliable manner (Automationanywhere.com); RPA is a technology that reduces employee workloads by automating repetitive, high-volume steps in processes (Nintex.com).

#### 2.1.2  Characteristics

[8] RPA is robotic software that is used to perform structured, routine, repetitive computer tasks and will be more optimally utilized if carried out in large volumes. Human activities on the computer will be imitated by robots, or also known as bots and with a much faster processing time, 100% accuracy rate, and work 24 h for 7 days and 1 week without getting tired and decreasing in ability. Bots can replicate the way humans perform repetitive tasks in an application, for example in data entry jobs and tasks related to transactions. The true purpose of RPA is to improve employee outcomes, not to replace their duties, so that robots will become effective and powerful assistants.

Another known term for RPA is robotic digital workspace. RPA differs from traditional automation, so some people may misunderstand it. The difference is that traditional automation requires application integration at the database or infrastructure level which can take months to implement, while RPA has several features that distinguish it from traditional automation as follows:

a. RPA is non-intrusive. RPA works in the scope of the front end system, does not interfere with the back end system.
b. RPA works across application types (Cross-Platform).
c. RPA has the ability to imitate human roles so that it can take action quickly.
d. RPA is scalable, so the additional workload needed is easy to handle and integrate.
e. RPA was developed to be easy to use by non-technical people, designed without programming code so that it is easy to learn.

The main advantage of all these features is that RPA is easy and fast to implement when compared to traditional automation which takes several months. RPA also does not require integration, because its work is carried out at the Graphical User Interface (GUI) User Interface (UI) layer in various systems. API capabilities in traditional automation are still required to move large amounts of data quickly and between systems, therefore RPA will not replace traditional automation roles as RPA only works on the User UI part.

[8] There are 2 types of RPA working modes, namely attended mode and unattended mode. In attended mode, humans are needed to be able to run it, while in unattended RPA mode runs according to a set schedule, or is run from an event. Unattended mode generally performs batch operations that do not require user intervention. For example, data entry of client information received on a spreadsheet into multiple applications. To get RPA effective in their workflows, companies need to understand the difference between Attended Bot and Unattended Bot.

Generally the Attended Bot runs on the local desktop and works in the same way as the end user, i.e. manipulating front-office programs. It can also be referred to as desktop automation. User requests or human-triggered events are responded exclusively by the Attended Bot so that it can also be referred to as the Personal Assistant of the end-user. End users can take advantage of the attended bot to do tedious and simple tasks like searching or retrieving specific customer data from one application to another quickly.

Generally, there are 3 main benefits of implementing a attended bot, namely:

a. Implementation time speed.
b. Speed of return on investment.
c. Uninterrupted workflow.

For a more extensive back-office implementation of the workflow we can use the Unattended Bot. Generally Unattended Bots run on servers with little or no human intervention. Unattended bots can run on a predefined schedule or in real time 24/7/365. Some examples of process scenarios that can use the Unattended Bot mode such as processing claims at insurance companies, processing account opening applications at banks, creating and distributing invoices from suppliers.

Unattended Bots can be controlled and scheduled remotely because they generally operate on virtual machines, unlike attended bots that work on local desktops. IT HR is very likely to be involved in configuring unattended bots. Generally, there are 3 main benefits obtained in implementing an unattended bot, namely:

a. Digital transformation, as the main advantage of unattended bots.
b. Optimally all business processes in the company.
c. Greater ROI potential.

6 Common activities that can be done by bots on the end-user side are data entry, copy and paste, mouse selection, screen navigation, login & logout, and web services invocation & DB Query. RPA will run effectively against the types of jobs that are rule-based and require manual entry. The RPA approach is to streamline existing internal business processes. Prof Leslie Willcocks in [6] said that the Return on Investment (ROI) of RPA implementation in companies varied from 30% to 200% in the first year, but also stated that it was wrong to think that RPA implementation was aimed at achieving short-term benefits.

## 3    Research Methods

### 3.1    Data Collection

The data collection in this study used the literature study method. Literature study is research conducted by researchers by collecting a number of books, magazines related to the problem and research objectives [16]. So based on this understanding, this research collects journal paper data related to RPA automation through sites that provide journals and RPA service provider sites. Data collection is carried out through several stages:

1. Search for journal paper data through journal provider sites and RPA service provider sites.
2. Journal paper data management using Mendeley.

### 3.2    Data Type

Based on the data collection method used, namely the study of literature, the type of data used is secondary data. Secondary data is a data source that does not directly provide data to data collectors, for example through other people or through documents [17].

### 3.3    Data Analysis

The data that has been collected in the previous stage will be processed in tabular form and analyzed by descriptive method.
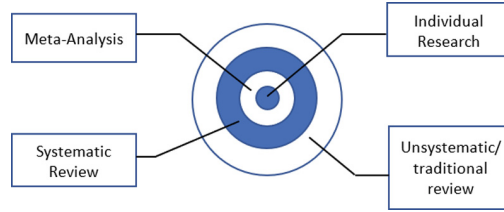
**Fig. 1.** Systematic review position with other methodologies (Siswanto, 2010)

### 3.4 Research Design

The method used is Systematic Literature Review (SLR). Systematic Review is a very rigorous procedure in identifying, assessing, and synthesizing all relevant research results related to research questions, specific topics, or phenomena of concern using strategies to limit bias [18]. Researchers have used a lot of systematic reviews to map areas of uncertainty, identify research that has been done, and also explore new studies that are needed. Systematic reviews can also flag areas of false certainty. The area of false certainty is something where we think we know more when in reality there is little evidence to support that knowledge [18].

The position of systematic review with other methodologies can be seen in Fig. 1.

The stages of the Systematic Review [18] are as shown in Table 1.

Based on the systematic review stages mentioned above, the design of this research can be described in the following design (Fig. 2).

### 3.5 Research Question

This stage is the stage where the researcher determines the questions that are appropriate to the research topic. The following are the research questions:

RQ1: What tasks do automation deployments perform the most?
RQ2: What business fields do automation research the most ?
RQ3: What is the most performance impact gained from implementing automation?

### 3.6 Research Process

The Research Process is carried out to obtain sources that are directly related to the problem under study to answer the Research Question (RQ) and other related references. The search keywords that can be applied are as follows: robotic process automation and/or RPA and/or automation.

**Table 1.** Stages in Systematic Review

| No | Stages | Research Question | Purpose | Prochedure Variation |
|---|---|---|---|---|
| 1. | Formulate the problem | Is there any relevance to the research question | Define variables and their relationships to find out their relevance | Variations in conceptual and definitions can lead to differences in research operations |
| 2. | Literature Search | What procedure should be used to find relevant articles | Identify sources (digital library) and keywords to find relevant articles | Variations in search sources may cause discrepancies |
| 3. | Gather information from articles | What information is relevant to the problem or research question | Gather relevant information from articles in a reliable way | a. Causes a difference in making cumulative conclusions. b. Causes different entries on the coding sheet. |
| 4 | Evaluating research quality | What research procedures are carried out in Research which can be used in synthesis | Identify and apply criteria to separate research to fit the research question | Variations in criteria in deciding which studies to use in the synthesis can cause differences |
| 5 | Analyze and integrate research results | What procedures should be used to summarize and combine research results | Identify and implement procedures to combine results across studies and examine differences in results between studies | Variations in the procedures used in each study such as narratives, vote counting, mean effect sizes can lead to differences in cumulative results |
| 6 | Interpreting evidence | What conclusions can be written cumulatively from the research evidence | Summarize the cumulative research evidence in terms of generality first and then the strengths and limitations of the study | Variations in (a) Significant labeling of results (b) special attention to specific studies may lead to differences in interpretation of findings. |
| 7 | Presentation of results | What information should be included in a systematic review report | Identify and implement what kind of editorial to make it easier for readers | (a) Lead the reader to judge more or less confidence in the synthesis results and (b) Influence others to replicate the results. |
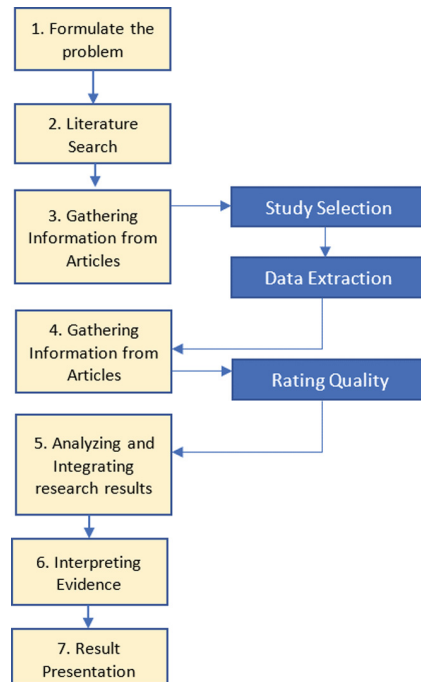
**Fig. 2.** Research Design

The process of searching for data sources is carried out on the following journal provider sites and RPA service provider sites:

1. bcpublication.org
2. researchgate.net
3. blueprism.com
4. e-journal.uajy.ac.id
5. springer.com
6. sciencedirect.com
7. essay.utwente.nl
8. mckinsey.com
9. ieeexplore.ieee.org
10. hbr.org
11. edgeverve.com
12. uipath.com
13. microsoft.com

## 3.7 Study Selection

This study used inclusion and exclusion criteria. Inclusion criteria are criteria that need to be met by each member of the population that can be taken as a sample. While the

**Table 2.** Mapping of data extraction properties into research question groups

| No | Property | Research Question |
|---|---|---|
| 1. | RPA Implementation | RQ1, RQ2 |
| 2. | Impact of RPA | RQ3 |

exclusion criteria are the characteristics of population members that cannot be sampled [19]. At this stage it is determined from the data to be collected, whether the data is suitable to be used as a data source for research or not. The following are the criteria used to declare the data obtained suitable for use:

1. Conduct research related to the implementation or impact of RPA implementation.
2. Conducting automation research using RPA technology.

### 3.8 Data Extraction

The data that has been obtained is extracted and collected based on a group of questions that are in accordance with this study. The extraction and grouping of the data is presented in the form of tabulated data so that it can be easily mapped and easy to read (Table 2).

### 3.9 Quality Assesment

At this stage the data that has been obtained will be evaluated based on the following questions:

1. QA1: Does the journal paper conduct RPA automation research ?
2. QA2: Does the journal paper discuss the implementation of RPA ?
3. QA3: Does the journal paper discuss the performance of RPA implementation?

Based on the quality of the assessment above, the journal papers that have been collected will be evaluated based on predetermined criteria. The journal paper will be rated according to the questions on the quality of the assessment. The values used are as follows:

1. Yes: for journal papers that match the questions in the quality assessment.
2. No: for journal papers that do not match the questions in the quality assessment.

### 3.10 Framework

See Fig. 3.
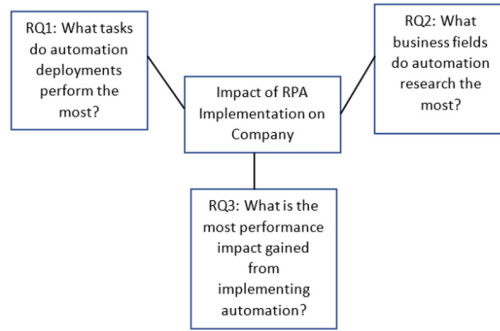
**Fig. 3.** Framework

**Table 3.** Summary of Journal Type

| No | Journal Type | Year | Sum |
|----|--------------|------|-----|
| 1 | RPA implementation analysis | 2021 | 7 |
| 2 | RPA implementation analysis | 2020 | 3 |
| 3 | Literature study of RPA implementation | 2019 | 6 |
| 4 | RPA implementation analysis | 2018 | 2 |
| 5 | RPA implementation analysis | 2017 | 3 |
| 6 | RPA implementation analysis | 2015 | 2 |
| | | | **23** |

## 4  Results and Discussion

The results of the research process and inclusion and exclusion criteria contained 23 journal papers used in this study which were published in the period 2017 to 2021. Table 3 are the groups of journal papers obtained.

### 4.1  Results of RQ1: Automated Tasks

Based on Research Question 1 or RQ1 about tasks that are automated based on the results of the research, it is found that the **Administration of Financial Records** and **Auditing** are the tasks that most have implemented RPA. These results can be seen in detail based on the mapping of automation tasks in Tables 4, 5, 6, 7, 8, 9, 10 and 11.

**Table 4.** Task Mapping: 75% of transaction work and 40% of reporting, planning and other strategic work can be automated [20]

| No | Category | Automation |
|---|---|---|
| 1 | Reporting | X |
| 2 | Planning | X |
| 3 | Sale | |
| 4 | Underwriting (Identification and selection of risks) | |
| 5 | Information Updates | |
| 6 | Reject Policy | |
| 7 | Cancel policy | |
| 8 | Claim Process | |
| 9 | Financial Reconciliation | |
| 10 | Financial Records Administration | X |
| 11 | HR Administration | |
| 12 | Supplier Selection | |
| 13 | Evaluation | |
| 14 | Relationship Management | |
| 15 | auditing | |
| 16 | Health services | |

**Table 5.** One in three of all tasks in healthcare can be automated [21]

| No | Category | Automation |
|---|---|---|
| 1 | Reporting | |
| 2 | Planning | |
| 3 | Sale | |
| 4 | Underwriting (Identification and selection of risks) | |
| 5 | Information Updates | |
| 6 | Reject Policy | |
| 7 | Cancel policy | |
| 8 | Claim Process | |
| 9 | Financial Reconciliation | |

**Table 5.** (*continued*)

| No | Category | Automation |
|---|---|---|
| 10 | Financial Records Administration | |
| 11 | HR Administration | |
| 12 | Supplier Selection | |
| 13 | Evaluation | |
| 14 | Relationship Management | |
| 15 | auditing | |
| 16 | Health services | X |

**Table 6.** Sales Process, Risk identification and selection process (Underwriting), Update information related to insurance policies such as bank information, reject and cancel policy if payment is not received, claim process, and financial data reconciliation [6]

| No | Category | Automation |
|---|---|---|
| 1 | Reporting | |
| 2 | Planning | |
| 3 | Sale | X |
| 4 | Underwriting (Identification and selection of risks) | X |
| 5 | Information Updates | X |
| 6 | Reject Policy | X |
| 7 | Cancel policy | X |
| 8 | Claim Process | X |
| 9 | Financial Reconciliation | X |
| 10 | Financial Records Administration | |
| 11 | HR Administration | |
| 12 | Supplier Selection | |
| 13 | Evaluation | |
| 14 | Relationship Management | |
| 15 | auditing | |
| 16 | Health services | |

**Table 7.** Mapping Tasks: administration of accounts payable, accounts receivable, billing, travel and expenses, fixed assets and HR administration [9].

| No | Category | Automation |
|----|----------|------------|
| 1 | Reporting | |
| 2 | Planning | |
| 3 | Sale | |
| 4 | Underwriting (Identification and selection of risks) | |
| 5 | Information Updates | |
| 6 | Reject Policy | |
| 7 | Cancel policy | |
| 8 | Claim Process | |
| 9 | Financial Reconciliation | |
| 10 | Financial Records Administration | X |
| 11 | HR Administration | X |
| 12 | Supplier Selection | |
| 13 | Evaluation | |
| 14 | Relationship Management | |
| 15 | auditing | |
| 16 | Health services | |

**Table 8.** Task Mapping: supplier selection, evaluation, and relationship management (Van Poucke et al., 2019) dalam [5]

| No | Category | Automation |
|----|----------|------------|
| 1 | Reporting | |
| 2 | Planning | |
| 3 | Sale | |
| 4 | Underwriting (Identification and selection of risks) | |
| 5 | Information Updates | |
| 6 | Reject Policy | |
| 7 | Cancel policy | |
| 8 | Claim Process | |
| 9 | Financial Reconciliation | |

(*continued*)

**Table 8.** (*continued*)

| No | Category | Automation |
|----|----------|------------|
| 10 | Financial Records Administration | |
| 11 | HR Administration | |
| 12 | Supplier Selection | X |
| 13 | Evaluation | X |
| 14 | Relationship Management | X |
| 15 | auditing | |
| 16 | Health services | |

**Table 9.** Task mapping: process improvement, reduction of unnecessary processes, and increased audit trail [12].

| No | Category | Automation |
|----|----------|------------|
| 1 | Reporting | |
| 2 | Planning | |
| 3 | Sale | |
| 4 | Underwriting (Identification and selection of risks) | |
| 5 | Information Updates | |
| 6 | Reject Policy | |
| 7 | Cancel policy | X |
| 8 | Claim Process | |
| 9 | Financial Reconciliation | |
| 10 | Financial Records Administration | |
| 11 | HR Administration | |
| 12 | Supplier Selection | |
| 13 | Evaluation | |
| 14 | Relationship Management | |
| 15 | auditing | |
| 16 | Health services | |

**Table 10.** Task Mapping: Robots can produce error-free, high-quality audit work and also the work that has been completed by Robots can see a reliable and trustworthy record of its activities [15].

| No | Category | Automation |
|----|----------|------------|
| 1 | Reporting | |
| 2 | Planning | |
| 3 | Sale | |
| 4 | Underwriting (Identification and selection of risks) | |
| 5 | Information Updates | |
| 6 | Reject Policy | |
| 7 | Cancel policy | X |
| 8 | Claim Process | |
| 9 | Financial Reconciliation | |
| 10 | Financial Records Administration | |
| 11 | HR Administration | |
| 12 | Supplier Selection | |
| 13 | Evaluation | |
| 14 | Relationship Management | |
| 15 | auditing | |
| 16 | Health services | |

**Table 11.** Task Mapping Recapitulation

| No | Category | Automation |
|----|----------|------------|
| 1 | Reporting | 1 |
| 2 | Planning | 1 |
| 3 | Sale | 1 |
| 4 | Underwriting (Identification and selection of risks) | 1 |
| 5 | Information Updates | 1 |
| 6 | Reject Policy | 1 |
| 7 | Cancel policy | 1 |
| 8 | Claim Process | 1 |
| 9 | Financial Reconciliation | 1 |
| 10 | Financial Records Administration | 2 |
| 11 | HR Administration | 1 |
| 12 | Supplier Selection | 1 |
| 13 | Evaluation | 1 |

**Table 11.** (*continued*)

| No | Category | Automation |
|----|----------|------------|
| 14 | Relationship Management | 1 |
| 15 | auditing | 2 |
| 16 | Health services | 1 |

**Table 12.** Mapping of areas that have and has the potential to implement automation – part 1

| No | Business fields | Banking | Financial Services |
|----|-----------------|---------|--------------------|
| 1 | Banking and Financial Services [20] | X | X |
| 2 | Banking and Financial Services [22] | X | X |
| 3 | Financial Audit Industry [11] | | |
| 4 | Finance and Accounting [12] | | X |
| 5 | Financing [23] | | |
| 6 | Auditing [15] | | |
| 7 | Banking [13] | X | |
| 8 | Insurance Sector [6] | | |
| 9 | Banking [24] | X | |
| 10 | Health [24] | | |
| 11 | Health [21] | | |
| 12 | Finance [24] | | X |
| 13 | Purchasing Supply Management (PSM) [5] | | |
| 14 | e-sourcing activities [5] | | |
| 15 | Industry 4.0 [25] | | |
| 16 | BISE (Business Information System Engineering) [10] | | |
| **Jumlah** | | 4 | 4 |

## 4.2 Results from RQ2: Areas that Have and Have the Potential to Apply Automation

Based on Research Question 2 or RQ2 regarding fields that have and have the potential to implement automation based on research results, it is found that **Banking** and **Financial Services** is the field that has implemented RPA the most. These results can be seen in detail based on the mapping of fields that have and have the potential to apply automation in Tables 12, 13, 14, 15, 16 and 17.

**Table 13.** Mapping of areas that have and could potentially apply automation – part 2

| No | Business fields | Auditing | Accounting |
|---|---|---|---|
| 1 | Banking and Financial Services [20] | | |
| 2 | Banking and Financial Services [22] | | |
| 3 | Financial Audit Industry [11] | X | |
| 4 | Finance and Accounting [12] | | X |
| 5 | Financing [23] | | |
| 6 | Auditing [15] | X | |
| 7 | Banking [13] | | |
| 8 | Insurance Sector [6] | | |
| 9 | Banking [24] | | |
| 10 | Health [24] | | |
| 11 | Health [21] | | |
| 12 | Finance [24] | | |
| 13 | Purchasing Supply Management (PSM) [5] | | |
| 14 | e-sourcing activities [5] | | |
| 15 | Industry 4.0 [25] | | |
| 16 | BISE (Business Information System Engineering) [10] | | |
| **Jumlah** | | 2 | 1 |

**Table 14.** Mapping of areas that have and could potentially apply automation – part 3

| No | Business fields | Financing | Insurance |
|---|---|---|---|
| 1 | Banking and Financial Services [20] | | |
| 2 | Banking and Financial Services [22] | | |
| 3 | Financial Audit Industry [11] | | |
| 4 | Finance and Accounting [12] | | |
| 5 | Financing [23] | X | |
| 6 | Auditing [15] | | |
| 7 | Banking [13] | | |
| 8 | Insurance Sector [6] | | X |
| 9 | Banking [24] | | |

**Table 14.** (*continued*)

| No | Business fields | Financing | Insurance |
|----|-----------------|-----------|-----------|
| 10 | Health [24] | | |
| 11 | Health [21] | | |
| 12 | Finance [24] | | |
| 13 | Purchasing Supply Management (PSM) [5] | | |
| 14 | e-sourcing activities [5] | | |
| 15 | Industry 4.0 [25] | | |
| 16 | BISE (Business Information System Engineering) [10] | | |
| **Jumlah** | | 1 | 1 |

**Table 15.** Mapping of areas that have and could potentially apply automation – part 4

| No | Business fields | Health | Purchasing Supply Manahgement |
|----|-----------------|--------|-------------------------------|
| 1 | Banking and Financial Services [20] | | |
| 2 | Banking and Financial Services [22] | | |
| 3 | Financial Audit Industry [11] | | |
| 4 | Finance and Accounting [12] | | |
| 5 | Financing [23] | | |
| 6 | Auditing [15] | | |
| 7 | Banking [13] | | |
| 8 | Insurance Sector [6] | | |
| 9 | Banking [24] | | |
| 10 | Health [24] | X | |
| 11 | Health [21] | X | |
| 12 | Finance [24] | | |
| 13 | Purchasing Supply Management (PSM) [5] | | X |
| 14 | e-sourcing activities [5] | | |
| 15 | Industry 4.0 [25] | | |
| 16 | BISE (Business Information System Engineering) [10] | | |
| **Jumlah** | | 2 | 1 |

**Table 16.** Mapping of areas that have and could potentially apply automation – part 5

| No | Business fields | e-Sourcing | Industry 4.0 | BISE (Business Information System Engineering) |
|---|---|---|---|---|
| 1 | Banking and Financial Services [20] | | | |
| 2 | Banking and Financial Services [22] | | | |
| 3 | Financial Audit Industry [11] | | | |
| 4 | Finance and Accounting [12] | | | |
| 5 | Financing [23] | | | |
| 6 | Auditing [15] | | | |
| 7 | Banking [13] | | | |
| 8 | Insurance Sector [6] | | | |
| 9 | Banking [24] | | | |
| 10 | Health [24] | | | |
| 11 | Health [21] | | | |
| 12 | Finance [24] | | | |
| 13 | Purchasing Supply Management (PSM) [5] | | | |
| 14 | e-sourcing activities [5] | X | | |
| 15 | Industry 4.0 [25] | | X | |
| 16 | BISE (Business Information System Engineering) [10] | | | X |
| **Jumlah** | | 1 | 1 | 1 |

**Table 17.** Recapitulation of Potential Automation Field Mapping

| No | Business fields | Sum |
|---|---|---|
| 1 | Banking | 4 |
| 2 | Financial Services | 4 |
| 3 | Audit | 2 |
| 4 | Accountancy | 1 |
| 5 | Financing | 1 |
| 6 | Insurance | 1 |
| 7 | Health | 2 |
| 8 | Purchasing Supply Management | 1 |
| 9 | e-Sourcing | 1 |
| 10 | Industry 4.0 | 1 |
| 11 | BISE (Business Information System Engineering) | 1 |

### 4.3 Results of RQ3: Impact of RPA Implementation on Performance

Based on Research Question 3 or RQ3 regarding the impact of implementing RPA on performance based on the results of the study, it was found that Internal Process Improvement and Productivity Improvement were the results that had the most impact on the implementation of RPA. These results can be seen in detail based on the mapping of the impact of the implementation of RPA in Tables 18, 19, 20, 21, 22, 23, 24, 25 and 26.

**Table 18.** Mapping the impact of implementing RPA on performance – Part 1

| No | Performance Impact | Cost Efficiency | Improve Problem Solving Ability |
|----|--------------------|-----------------|---------------------------------|
| 1 | The level of cost is low and the ability to solve problems is good compared to traditional methods [6]. | X | X |
| 2 | The creation of more attractive jobs for the human workforce [6]. | | |
| 3 | Return of Investment (ROI) of RPA implementation in companies varies from 30% to 200% in the first year [6]. | | |
| 4 | Reduce Cost [6] | X | |
| 5 | Better Customer Experiences [6] | | |
| 6 | Lower Operational Risk [6] | | |
| 7 | Improved Internal Processes [6] | | |
| 8 | Productivity [6] | | |
| 9 | RPA does not replace the current IT Legacy system, instead it enhances the existing ICT system [6]. | | |
| 10 | efficiency of working time on the type of work that is repetitive [15]; [12] | | |
| 11 | Number of working hours, reduction of precarious employees, transition from manual, rule-based analysis and easing things that customers need to do [12]. | X | |
| 12 | The use of robots can reduce the cycle time of work, but does not reduce the number of stations [7]. | | |
| 13 | Reducing errors and improving the quality of the process [12]. | | |
| 14 | There is a perception that RPA poses risks and weaknesses in terms of environmental control [12]. | | |

*(continued)*

**Table 18.** (*continued*)

| No | Performance Impact | Cost Efficiency | Improve Problem Solving Ability |
|----|---|---|---|
| 15 | Improved processes, reduced unnecessary processes, and increased audit footprint accompanied by increased compliance [26]. | | |
| 16 | Every software activity is logged [26] | | |
| 17 | Reduce the uncertainty of working time, can reduce workers' exposure to hazards and the absence of workers does not reduce production capacity [7]. | | |
| 18 | Assignment to robots can reduce the uncertainty of working time, can reduce workers' exposure to hazards and the absence of workers does not reduce production capacity [7]. | | |
| 19 | RPA is very helpful in terms of error rate, consistency, large volume, speed, and price point [4]. | | |
| 20 | The RPA that was built succeeded in increasing the speed of the process to 8,065x compared to processes that were done manually by employees [23]. | | |
| 21 | Cost reduction resulting from increased productivity [9]. | X | |
| 22 | RPA also shows positive effects for supplier relations, integration, and capability development [5]. | | |
| 23 | The implementation of RPA for 3 years resulted in an ROI of 110%, Net Present Value (NPV) of $8,716,290, Payback Period (PP) 10 months, Profit from productivity efficiency of $993.1K, Cash Collection Process of $417.0K, Process Reconciliation for $1.4M, Quality Checks for $4.2M and job automation for permanent employees (FTE) for $9.6M [27]. | | |
| 24 | The implementation of RPA for 3 years resulted in an ROI of 97%, Profit of $12.08M (PV), NPV of $5.94M, Payback Period (PP) of less than 6 months [28]. | | |
| 25 | Implementation of RPA for 3 years resulted in ROI of 502%, Profit (PV) of $31.08M, NPV of $25.92M and Payback for 11 months [29] | | |
| **Jumlah** | | 4 | 1 |

**Table 19.** Mapping the impact of implementing RPA on performance – Part 2

| No | Performance Impact | New Job Creation | Financial Performance Improvement |
|---|---|---|---|
| 1 | The level of cost is low and the ability to solve problems is good compared to traditional methods [6]. | | |
| 2 | The creation of more attractive jobs for the human workforce [6]. | X | |
| 3 | Return of Investment (ROI) of RPA implementation in companies varies from 30% to 200% in the first year [6]. | | X |
| 4 | Reduce Cost [6] | | |
| 5 | Better Customer Experiences [6] | | |
| 6 | Lower Operational Risk [6] | | |
| 7 | Improved Internal Processes [6] | | |
| 8 | Productivity [6] | | |
| 9 | RPA does not replace the current IT Legacy system, instead it enhances the existing ICT system [6]. | | |
| 10 | efficiency of working time on the type of work that is repetitive [15]; [12] | | |
| 11 | Number of working hours, reduction of precarious employees, transition from manual, rule-based analysis and easing things that customers need to do [12]. | | |
| 12 | The use of robots can reduce the cycle time of work, but does not reduce the number of stations [7]. | | |
| 13 | Reducing errors and improving the quality of the process [12]. | | |
| 14 | There is a perception that RPA poses risks and weaknesses in terms of environmental control [12]. | | |
| 15 | Improved processes, reduced unnecessary processes, and increased audit footprint accompanied by increased compliance [26]. | | |
| 16 | Every software activity is logged [26] | | |
| 17 | Reduce the uncertainty of working time, can reduce workers' exposure to hazards and the absence of workers does not reduce production capacity [7]. | | |
| 18 | Assignment to robots can reduce the uncertainty of working time, can reduce workers' exposure to hazards and the absence of workers does not reduce production capacity [7]. | | |

Table 19.  (*continued*)

| No | Performance Impact | New Job Creation | Financial Performance Improvement |
|---|---|---|---|
| 19 | RPA is very helpful in terms of error rate, consistency, large volume, speed, and price point [4]. | | |
| 20 | The RPA that was built succeeded in increasing the speed of the process to 8,065x compared to processes that were done manually by employees [23]. | | |
| 21 | Cost reduction resulting from increased productivity [9]. | | |
| 22 | RPA also shows positive effects for supplier relations, integration, and capability development [5]. | | |
| 23 | The implementation of RPA for 3 years resulted in an ROI of 110%, Net Present Value (NPV) of $8,716,290, Payback Period (PP) 10 months, Profit from productivity efficiency of $993.1K, Cash Collection Process of $417.0K, Process Reconciliation for $1.4M, Quality Checks for $4.2M and job automation for permanent employees (FTE) for $9.6M [27]. | | X |
| 24 | The implementation of RPA for 3 years resulted in an ROI of 97%, Profit of $12.08M (PV), NPV of $5.94M, Payback Period (PP) of less than 6 months [28]. | | X |
| 25 | Implementation of RPA for 3 years resulted in ROI of 502%, Profit (PV) of $31.08M, NPV of $25.92M and Payback for 11 months [29] | | X |
| **Jumlah** | | 1 | 4 |

Table 20.  Mapping the impact of implementing RPA on performance – Part 3

| No | Performance Impact | Improved Customer Experience | Low Operational Risk |
|---|---|---|---|
| 1 | The level of cost is low and the ability to solve problems is good compared to traditional methods [6]. | | |
| 2 | The creation of more attractive jobs for the human workforce [6]. | | |
| 3 | Return of Investment (ROI) of RPA implementation in companies varies from 30% to 200% in the first year [6]. | | |
| 4 | Reduce Cost [6] | | X |

(*continued*)

**Table 20.**  (*continued*)

| No | Performance Impact | Improved Customer Experience | Low Operational Risk |
|---|---|---|---|
| 5 | Better Customer Experiences [6] | X | |
| 6 | Lower Operational Risk [6] | | X |
| 7 | Improved Internal Processes [6] | | |
| 8 | Productivity [6] | | |
| 9 | RPA does not replace the current IT Legacy system, instead it enhances the existing ICT system [6]. | | |
| 10 | efficiency of working time on the type of work that is repetitive [15]; [12] | | |
| 11 | Number of working hours, reduction of precarious employees, transition from manual, rule-based analysis and easing things that customers need to do [12]. | X | |
| 12 | The use of robots can reduce the cycle time of work, but does not reduce the number of stations [7]. | | |
| 13 | Reducing errors and improving the quality of the process [12]. | | |
| 14 | There is a perception that RPA poses risks and weaknesses in terms of environmental control [12]. | | |
| 15 | Improved processes, reduced unnecessary processes, and increased audit footprint accompanied by increased compliance [26]. | | |
| 16 | Every software activity is logged [26] | | |
| 17 | Reduce the uncertainty of working time, can reduce workers' exposure to hazards and the absence of workers does not reduce production capacity [7]. | | |
| 18 | Assignment to robots can reduce the uncertainty of working time, can reduce workers' exposure to hazards and the absence of workers does not reduce production capacity [7]. | | |
| 19 | RPA is very helpful in terms of error rate, consistency, large volume, speed, and price point [4]. | | |
| 20 | The RPA that was built succeeded in increasing the speed of the process to 8,065x compared to processes that were done manually by employees [23]. | | |
| 21 | Cost reduction resulting from increased productivity [9]. | | |
| 22 | RPA also shows positive effects for supplier relations, integration, and capability development [5]. | | |

**Table 20.**  (*continued*)

| No | Performance Impact | Improved Customer Experience | Low Operational Risk |
|----|--------------------|------------------------------|----------------------|
| 23 | The implementation of RPA for 3 years resulted in an ROI of 110%, Net Present Value (NPV) of $8,716,290, Payback Period (PP) 10 months, Profit from productivity efficiency of $993.1K, Cash Collection Process of $417.0K, Process Reconciliation for $1.4M, Quality Checks for $4.2M and job automation for permanent employees (FTE) for $9.6M [27]. | | |
| 24 | The implementation of RPA for 3 years resulted in an ROI of 97%, Profit of $12.08M (PV), NPV of $5.94M, Payback Period (PP) of less than 6 months [28]. | | |
| 25 | Implementation of RPA for 3 years resulted in ROI of 502%, Profit (PV) of $31.08M, NPV of $25.92M and Payback for 11 months [29] | | |
| **Jumlah** | | 2 | 2 |

**Table 21.**  Mapping the impact of implementing RPA on performance – Part 4

| No | Performance Impact | Internal Process Improvement | Productivity Boost |
|----|--------------------|------------------------------|--------------------|
| 1 | The level of cost is low and the ability to solve problems is good compared to traditional methods [6]. | | |
| 2 | The creation of more attractive jobs for the human workforce [6]. | | |
| 3 | Return of Investment (ROI) of RPA implementation in companies varies from 30% to 200% in the first year [6]. | | |
| 4 | Reduce Cost [6] | | |
| 5 | Better Customer Experiences [6] | | |
| 6 | Lower Operational Risk [6] | | |
| 7 | Improved Internal Processes [6] | X | |
| 8 | Productivity [6] | | X |
| 9 | RPA does not replace the current IT Legacy system, instead it enhances the existing ICT system [6]. | | |

**Table 21.** (*continued*)

| No | Performance Impact | Internal Process Improvement | Productivity Boost |
|---|---|---|---|
| 10 | efficiency of working time on the type of work that is repetitive [15]; [12] | | |
| 11 | Number of working hours, reduction of precarious employees, transition from manual, rule-based analysis and easing things that customers need to do [12]. | | |
| 12 | The use of robots can reduce the cycle time of work, but does not reduce the number of stations [7]. | | |
| 13 | Reducing errors and improving the quality of the process [12]. | X | X |
| 14 | There is a perception that RPA poses risks and weaknesses in terms of environmental control [12]. | | |
| 15 | Improved processes, reduced unnecessary processes, and increased audit footprint accompanied by increased compliance [26]. | X | |
| 16 | Every software activity is logged [26] | | |
| 17 | Reduce the uncertainty of working time, can reduce workers' exposure to hazards and the absence of workers does not reduce production capacity [7]. | X | X |
| 18 | Assignment to robots can reduce the uncertainty of working time, can reduce workers' exposure to hazards and the absence of workers does not reduce production capacity [7]. | X | X |
| 19 | RPA is very helpful in terms of error rate, consistency, large volume, speed, and price point [4]. | X | X |
| 20 | The RPA that was built succeeded in increasing the speed of the process to 8,065x compared to processes that were done manually by employees [23]. | X | X |
| 21 | Cost reduction resulting from increased productivity [9]. | | X |
| 22 | RPA also shows positive effects for supplier relations, integration, and capability development [5]. | X | X |
| 23 | The implementation of RPA for 3 years resulted in an ROI of 110%, Net Present Value (NPV) of $8,716,290, Payback Period (PP) 10 months, Profit from productivity efficiency of $993.1K, Cash Collection Process of $417.0K, Process Reconciliation for $1.4M, Quality Checks for $4.2M and job automation for permanent employees (FTE) for $9.6M [27]. | | |

**Table 21.**  (*continued*)

| No | Performance Impact | Internal Process Improvement | Productivity Boost |
|---|---|---|---|
| 24 | The implementation of RPA for 3 years resulted in an ROI of 97%, Profit of $12.08M (PV), NPV of $5.94M, Payback Period (PP) of less than 6 months [28]. | | |
| 25 | Implementation of RPA for 3 years resulted in ROI of 502%, Profit (PV) of $31.08M, NPV of $25.92M and Payback for 11 months [29] | | |
| **Jumlah** | | 8 | 8 |

**Table 22.**  Mapping the impact of implementing RPA on performance – Part 5

| No | Performance Impact | Improving Existing ICT System | Time efficiency |
|---|---|---|---|
| 1 | The level of cost is low and the ability to solve problems is good compared to traditional methods [6]. | | |
| 2 | The creation of more attractive jobs for the human workforce [6]. | | |
| 3 | Return of Investment (ROI) of RPA implementation in companies varies from 30% to 200% in the first year [6]. | | |
| 4 | Reduce Cost [6] | | |
| 5 | Better Customer Experiences [6] | | |
| 6 | Lower Operational Risk [6] | | |
| 7 | Improved Internal Processes [6] | | |
| 8 | Productivity [6] | | |
| 9 | RPA does not replace the current IT Legacy system, instead it enhances the existing ICT system [6]. | X | |
| 10 | efficiency of working time on the type of work that is repetitive [15]; [12] | | X |
| 11 | Number of working hours, reduction of precarious employees, transition from manual, rule-based analysis and easing things that customers need to do [12]. | | X |
| 12 | The use of robots can reduce the cycle time of work, but does not reduce the number of stations [7]. | | X |
| 13 | Reducing errors and improving the quality of the process [12]. | | |

**Table 22.** (*continued*)

| No | Performance Impact | Improving Existing ICT System | Time efficiency |
|---|---|---|---|
| 14 | There is a perception that RPA poses risks and weaknesses in terms of environmental control [12]. | | |
| 15 | Improved processes, reduced unnecessary processes, and increased audit footprint accompanied by increased compliance [26]. | | |
| 16 | Every software activity is logged [26] | | |
| 17 | Reduce the uncertainty of working time, can reduce workers' exposure to hazards and the absence of workers does not reduce production capacity [7]. | | |
| 18 | Assignment to robots can reduce the uncertainty of working time, can reduce workers' exposure to hazards and the absence of workers does not reduce production capacity [7]. | | |
| 19 | RPA is very helpful in terms of error rate, consistency, large volume, speed, and price point [4]. | | |
| 20 | The RPA that was built succeeded in increasing the speed of the process to 8,065x compared to processes that were done manually by employees [23]. | | |
| 21 | Cost reduction resulting from increased productivity [9]. | | |
| 22 | RPA also shows positive effects for supplier relations, integration, and capability development [5]. | | |
| 23 | The implementation of RPA for 3 years resulted in an ROI of 110%, Net Present Value (NPV) of $8,716,290, Payback Period (PP) 10 months, Profit from productivity efficiency of $993.1K, Cash Collection Process of $417.0K, Process Reconciliation for $1.4M, Quality Checks for $4.2M and job automation for permanent employees (FTE) for $9.6M [27]. | | |
| 24 | The implementation of RPA for 3 years resulted in an ROI of 97%, Profit of $12.08M (PV), NPV of $5.94M, Payback Period (PP) of less than 6 months [28]. | | |
| 25 | Implementation of RPA for 3 years resulted in ROI of 502%, Profit (PV) of $31.08M, NPV of $25.92M and Payback for 11 months [29] | | |
| **Jumlah** | | 1 | 3 |

**Table 23.** Mapping the impact of implementing RPA on performance – Part 6

| No | Performance Impact | Environmental Control Risk | Improved Audit Footprint |
|---|---|---|---|
| 1 | The level of cost is low and the ability to solve problems is good compared to traditional methods [6]. | | |
| 2 | The creation of more attractive jobs for the human workforce [6]. | | |
| 3 | Return of Investment (ROI) of RPA implementation in companies varies from 30% to 200% in the first year [6]. | | |
| 4 | Reduce Cost [6] | | |
| 5 | Better Customer Experiences [6] | | |
| 6 | Lower Operational Risk [6] | | |
| 7 | Improved Internal Processes [6] | | |
| 8 | Productivity [6] | | |
| 9 | RPA does not replace the current IT Legacy system, instead it enhances the existing ICT system [6]. | | |
| 10 | efficiency of working time on the type of work that is repetitive [15]; [12] | | |
| 11 | Number of working hours, reduction of precarious employees, transition from manual, rule-based analysis and easing things that customers need to do [12]. | | |
| 12 | The use of robots can reduce the cycle time of work, but does not reduce the number of stations [7]. | | |
| 13 | Reducing errors and improving the quality of the process [12]. | | |
| 14 | There is a perception that RPA poses risks and weaknesses in terms of environmental control [12]. | X | |
| 15 | Improved processes, reduced unnecessary processes, and increased audit footprint accompanied by increased compliance [26]. | | X |
| 16 | Every software activity is logged [26] | | |
| 17 | Reduce the uncertainty of working time, can reduce workers' exposure to hazards and the absence of workers does not reduce production capacity [7]. | | |
| 18 | Assignment to robots can reduce the uncertainty of working time, can reduce workers' exposure to hazards and the absence of workers does not reduce production capacity [7]. | | |

(*continued*)

**Table 23.** (*continued*)

| No | Performance Impact | Environmental Control Risk | Improved Audit Footprint |
|---|---|---|---|
| 19 | RPA is very helpful in terms of error rate, consistency, large volume, speed, and price point [4]. | | |
| 20 | The RPA that was built succeeded in increasing the speed of the process to 8,065x compared to processes that were done manually by employees [23]. | | |
| 21 | Cost reduction resulting from increased productivity [9]. | | |
| 22 | RPA also shows positive effects for supplier relations, integration, and capability development [5]. | | |
| 23 | The implementation of RPA for 3 years resulted in an ROI of 110%, Net Present Value (NPV) of $8,716,290, Payback Period (PP) 10 months, Profit from productivity efficiency of $993.1K, Cash Collection Process of $417.0K, Process Reconciliation for $1.4M, Quality Checks for $4.2M and job automation for permanent employees (FTE) for $9.6M [27]. | | |
| 24 | The implementation of RPA for 3 years resulted in an ROI of 97%, Profit of $12.08M (PV), NPV of $5.94M, Payback Period (PP) of less than 6 months [28]. | | |
| 25 | Implementation of RPA for 3 years resulted in ROI of 502%, Profit (PV) of $31.08M, NPV of $25.92M and Payback for 11 months [29] | | |
| **Jumlah** | | 1 | 1 |

**Table 24.** Mapping the impact of implementing RPA on performance – Part 7

| No | Performance Impact | Improved Compliance | Better Activity Logging |
|---|---|---|---|
| 1 | The level of cost is low and the ability to solve problems is good compared to traditional methods [6]. | | |
| 2 | The creation of more attractive jobs for the human workforce [6]. | | |
| 3 | Return of Investment (ROI) of RPA implementation in companies varies from 30% to 200% in the first year [6]. | | |
| 4 | Reduce Cost [6] | | |
| 5 | Better Customer Experiences [6] | | |

(*continued*)

**Table 24.** (*continued*)

| No | Performance Impact | Improved Compliance | Better Activity Logging |
|---|---|---|---|
| 6 | Lower Operational Risk [6] | | |
| 7 | Improved Internal Processes [6] | | |
| 8 | Productivity [6] | | |
| 9 | RPA does not replace the current IT Legacy system, instead it enhances the existing ICT system [6]. | | |
| 10 | efficiency of working time on the type of work that is repetitive [15]; [12] | | |
| 11 | Number of working hours, reduction of precarious employees, transition from manual, rule-based analysis and easing things that customers need to do [12]. | | |
| 12 | The use of robots can reduce the cycle time of work, but does not reduce the number of stations [7]. | | |
| 13 | Reducing errors and improving the quality of the process [12]. | | |
| 14 | There is a perception that RPA poses risks and weaknesses in terms of environmental control [12]. | | |
| 15 | Improved processes, reduced unnecessary processes, and increased audit footprint accompanied by increased compliance [26]. | X | |
| 16 | Every software activity is logged [26] | | X |
| 17 | Reduce the uncertainty of working time, can reduce workers' exposure to hazards and the absence of workers does not reduce production capacity [7]. | X | |
| 18 | Assignment to robots can reduce the uncertainty of working time, can reduce workers' exposure to hazards and the absence of workers does not reduce production capacity [7]. | X | |
| 19 | RPA is very helpful in terms of error rate, consistency, large volume, speed, and price point [4]. | | |
| 20 | The RPA that was built succeeded in increasing the speed of the process to 8,065x compared to processes that were done manually by employees [23]. | | |
| 21 | Cost reduction resulting from increased productivity [9]. | | |
| 22 | RPA also shows positive effects for supplier relations, integration, and capability development [5]. | | |

**Table 24.** (*continued*)

| No | Performance Impact | Improved Compliance | Better Activity Logging |
|---|---|---|---|
| 23 | The implementation of RPA for 3 years resulted in an ROI of 110%, Net Present Value (NPV) of $8,716,290, Payback Period (PP) 10 months, Profit from productivity efficiency of $993.1K, Cash Collection Process of $417.0K, Process Reconciliation for $1.4M, Quality Checks for $4.2M and job automation for permanent employees (FTE) for $9.6M [27]. | | |
| 24 | The implementation of RPA for 3 years resulted in an ROI of 97%, Profit of $12.08M (PV), NPV of $5.94M, Payback Period (PP) of less than 6 months [28]. | | |
| 25 | Implementation of RPA for 3 years resulted in ROI of 502%, Profit (PV) of $31.08M, NPV of $25.92M and Payback for 11 months [29] | | |
| **Jumlah** | | 3 | 1 |

**Table 25.** Mapping the impact of implementing RPA on performance – Part 8

| No | Performance Impact | Reducing the level of hazard exposure to workers | Improve relationship with related parties |
|---|---|---|---|
| 1 | The level of cost is low and the ability to solve problems is good compared to traditional methods [6]. | | |
| 2 | The creation of more attractive jobs for the human workforce [6]. | | |
| 3 | Return of Investment (ROI) of RPA implementation in companies varies from 30% to 200% in the first year [6]. | | |
| 4 | Reduce Cost [6] | | |
| 5 | Better Customer Experiences [6] | | |
| 6 | Lower Operational Risk [6] | | |
| 7 | Improved Internal Processes [6] | | |
| 8 | Productivity [6] | | |
| 9 | RPA does not replace the current IT Legacy system, instead it enhances the existing ICT system [6]. | | |
| 10 | efficiency of working time on the type of work that is repetitive [15]; [12] | | |

**Table 25.** (*continued*)

| No | Performance Impact | Reducing the level of hazard exposure to workers | Improve relationship with related parties |
|----|--------------------|--------------------------------------------------|-------------------------------------------|
| 11 | Number of working hours, reduction of precarious employees, transition from manual, rule-based analysis and easing things that customers need to do [12]. | | |
| 12 | The use of robots can reduce the cycle time of work, but does not reduce the number of stations [7]. | | |
| 13 | Reducing errors and improving the quality of the process [12]. | | |
| 14 | There is a perception that RPA poses risks and weaknesses in terms of environmental control [12]. | | |
| 15 | Improved processes, reduced unnecessary processes, and increased audit footprint accompanied by increased compliance [26]. | | |
| 16 | Every software activity is logged [26] | | |
| 17 | Reduce the uncertainty of working time, can reduce workers' exposure to hazards and the absence of workers does not reduce production capacity [7]. | X | |
| 18 | Assignment to robots can reduce the uncertainty of working time, can reduce workers' exposure to hazards and the absence of workers does not reduce production capacity [7]. | X | |
| 19 | RPA is very helpful in terms of error rate, consistency, large volume, speed, and price point [4]. | | |
| 20 | The RPA that was built succeeded in increasing the speed of the process to 8,065x compared to processes that were done manually by employees [23]. | | |
| 21 | Cost reduction resulting from increased productivity [9]. | | |
| 22 | RPA also shows positive effects for supplier relations, integration, and capability development [5]. | | X |
| 23 | The implementation of RPA for 3 years resulted in an ROI of 110%, Net Present Value (NPV) of $8,716,290, Payback Period (PP) 10 months, Profit from productivity efficiency of $993.1K, Cash Collection Process of $417.0K, Process Reconciliation for $1.4M, Quality Checks for $4.2M and job automation for permanent employees (FTE) for $9.6M [27]. | | |

**Table 25.** (*continued*)

| No | Performance Impact | Reducing the level of hazard exposure to workers | Improve relationship with related parties |
|---|---|---|---|
| 24 | The implementation of RPA for 3 years resulted in an ROI of 97%, Profit of $12.08M (PV), NPV of $5.94M, Payback Period (PP) of less than 6 months [28]. | | |
| 25 | Implementation of RPA for 3 years resulted in ROI of 502%, Profit (PV) of $31.08M, NPV of $25.92M and Payback for 11 months [29] | | |
| **Jumlah** | | 2 | 1 |

**Table 26.** Recapitulation Mapping the impact of RPA implementation on performance

| No | Impact | Sum |
|---|---|---|
| 1 | Cost Efficiency | 4 |
| 2 | Improve Problem Solving Ability | 1 |
| 3 | New Job Creation | 1 |
| 4 | Financial Performance Improvement | 4 |
| 5 | Improved Customer Experience | 2 |
| 6 | Low Operational Risk | 2 |
| 7 | Internal Process Improvement | 8 |
| 8 | Productivity Boost | 8 |
| 9 | Improving Existing ICT System | 1 |
| 10 | Time efficiency | 3 |
| 11 | Environmental Control Risk | 1 |
| 12 | Improved Audit Footprint | 1 |
| 13 | Improved Compliance | 3 |
| 14 | Better Activity Logging | 1 |
| 15 | Reducing the level of hazard exposure to workers | 2 |
| 16 | Improve relationship with related parties | 1 |

## 5   Conclusion

Based on the results of the research that has been carried out, it can be concluded that the results of a systematic literature review of all research contained in journals from 2017 to 2021 regarding the application of RPA research are mostly carried out in the

financial sector. The financial sector is one of the business processes that performs the most repetitive tasks and with a large amount of data, so that in the early stages of implementing RPA, companies will prefer to start their first project in the most feasible and easy field for testing the implementation of automation. This is in line with research [30] that E&Y has implemented RPA projects in 20 countries and found that 30–50% of RPA projects failed to be implemented due to using the wrong implementation methods and approaches. The key to a successful RPA implementation is to create a pilot project to automate a small but big impact business process. After this pilot project was successful, the implementation of RPA began to be extended to other business processes.

Based on the results of the research that has been done, it can be mapped which fields have not been done too much research related to automation using RPA so that for research development, further researchers can select research in fields that have not been done too much research related to RPA automation.

# References

1. Sterling.com, "Apa itu RPA (Robotic Process Automation)?," 2019. https://www.sterling-team.com/news/apa-itu-rpa-robotic-process-automation/ (accessed May 21, 2022).
2. Nintex.com, "How RPA Benefits Across various Industries - Nintex," 2019. https://www.nintex.com/blog/rpa-benefits/ (accessed May 21, 2022).
3. mii.co.id, "RPA di Berbagai Industri," 2019. https://www.mii.co.id/en/insight/listing/2019/12/10/02/52/rpa-di-berbagai-industri (accessed May 20, 2022).
4. L. Willcocks, M. C. Lacity, and A. Craig, "Robotic Process Automation at Xchanging," 2015.
5. C. Flechsig, F. Anslinger, and R. Lasch, "Robotic Process Automation in purchasing and supply management: A multiple case study on potentials, barriers, and implementation," *J. Purch. Supply Manag.*, vol. 28, no. 1, p. 100718, 2022, doi: https://doi.org/10.1016/j.pursup.2021.100718.
6. McKinsey, "The value of robotic process automation," 2017. https://www.mckinsey.com/industries/financial-services/our-insights/the-value-of-robotic-process-automation (accessed May 20, 2022).
7. T. Koltai, I. Dimény, V. Gallina, A. Gaal, and C. Sepe, "An analysis of task assignment and cycle times when robots are added to human-operated assembly lines, using mathematical programming models," *Int. J. Prod. Econ.*, vol. 242, 2021, doi: https://doi.org/10.1016/j.ijpe.2021.108292.
8. D. Fernando and H. Harsiti, "Studi Literatur: Robotic Process Automation," *JSiI (Jurnal Sist. Informasi)*, vol. 6, no. 1, pp. 6–11, 2019, doi: https://doi.org/10.30656/jsii.v6i1.1071.
9. S. Aguirre and A. Rodriguez, "Automation of a Business Process Using Robotic Process Automation (RPA): A Case Study," *Springer Int. Publ. AG*, 2017, doi: https://doi.org/10.1007/978-3-319-66963-2_7.
10. W. M. P. van der Aalst, M. Bichler, and A. Heinzl, "Robotic Process Automation," *Bus. Inf. Syst. Eng.*, vol. 60, no. 4, pp. 269–272, 2018, doi: https://doi.org/10.1007/s12599-018-0542-4.
11. F. Huang and M. A. Vasarhelyi, "Applying robotic process automation (RPA) in auditing: A framework," *Int. J. Account. Inf. Syst.*, vol. 35, 2019, doi: https://doi.org/10.1016/j.accinf.2019.100433.
12. J. Kokina and S. Blanchette, "Early evidence of digital labor in accounting: Innovation with Robotic Process Automation," *Int. J. Account. Inf. Syst.*, vol. 35, p. 100431, 2019, doi: https://doi.org/10.1016/j.accinf.2019.100431.

13. M. Romao, J. Costa, and C. J. Costa, "Robotic process automation: A case study in the banking industry," *Iber. Conf. Inf. Syst. Technol. Cist.*, vol. 14, 2019, doi: https://doi.org/10.23919/CISTI.2019.8760733.

14. J. Ribeiro, R. Lima, T. Eckhardt, and S. Paiva, "Robotic Process Automation and Artificial Intelligence in Industry 4.0 - A Literature review," *Procedia Comput. Sci.*, vol. 181, pp. 51–58, 2021, doi: https://doi.org/10.1016/j.procs.2021.01.104.

15. K. C. Moffitt, A. M. Rozario, and M. A. Vasarhelyi, "Robotic process automation for auditing," *J. Emerg. Technol. Account.*, vol. 15, no. 1, pp. 1–10, 2018, doi: https://doi.org/10.2308/jeta-10589.

16. E. Danial and N. Warsiah, *Metode Penulisan Karya Ilmiah.* Bandung: Laboratorium Pendidikan Kewarganegaraan, 2009.

17. Sugiyono, *Metode Penelitian Kuantitatif, Kualitatif dan R&D.* Bandung: Alfabeta, 2008.

18. S. Hadi, H. K. Thahjono, and M. Palupi, *Systematic Review: Meta Sintesis Untuk Riset Perilaku Organisasional.* 2020.

19. S. Notoatmodjo, *Metodologi Penelitian Kesehatan.* Jakarta: Rineka Cipta, 2010.

20. J. Bughin *et al.*, "A Future That Works: Automation, Employment, and Productivity," *McKinsey Glob. Inst.*, no. January, pp. 1–28, 2017, [Online]. Available: http://njit2.mrooms.net/pluginfile.php/688844/mod_resource/content/1/Executive Summary of McKinsey Report on Automation.pdf

21. B. Carrus, S. Chowdhary, and R. Whiteman, "Making healthcare more affordable through scalable automation," *McKinsey Digit.*, 2020, Accessed: Jun. 15, 2022. [Online]. Available: https://www.mckinsey.com/business-functions/operations/our-insights/making-healthcare-more-affordable-through-scalable-automation

22. McKinsey, "Global survey: The state of AI in 2020," 2020. https://www.mckinsey.com/business-functions/quantumblack/our-insights/global-survey-the-state-of-ai-in-2020 (accessed Jun. 15, 2022).

23. L. D. Girisoma, "Pembangunan Robotic Process Automation Untuk Proses Penggajian Sales Multiguna Bagi Perusahaan Astra Credit Companies," Universitas Atma Jaya Yogyakarta, 2020.

24. Z. Fu, Q. Teng, X. Wang, and X. Wu, "Analysis for the Robotic process automation firm's future development based on the business model," *BCP Bus. Manag.*, vol. 14, pp. 208–215, 2021, doi: https://doi.org/10.54691/bcpbm.v14i.146.

25. J. Ribeiro, R. Lima, T. Eckhardt, and S. Paiva, "Robotic Process Automation and Artificial Intelligence in Industry 4.0 - A Literature review," *Procedia Comput. Sci.*, vol. 181, no. 2019, pp. 51–58, 2021, doi: https://doi.org/10.1016/j.procs.2021.01.104.

26. M. Lacity and L. Willcocks, "What knowledge workers stand to gain from automation," *Harv. Bus. Rev.*, 2015, [Online]. Available: https://hbr.org/2015/06/what-knowledge-workers-stand-to-gain-from-automation

27. S. Pegatraju and Z. Tai Ng, "The Total Economic Impact $^{TM}$ Of EdgeVerve AssistEdge RPA Platform," *Forrester TEI*, no. January, 2021.

28. J. ten Sythoff, "The Total Economic Impact Of The UiPath Platform," *Forrester TEI*, 2021, [Online]. Available: https://www.sap.com/bin/sapcom/en_us/downloadasset.2015-03-mar-24-01.the-total-economic-impact-of-sap-jam-cost-savings-and-business-benefits-enabled-by-sap-jam-forrester-pdf.bypassReg.html

29. M. Diagne and J. Lipsitz, "The Total Economic Impact $^{TM}$ Of Microsoft Power Platform," *Forrester TEI*, 2021.

30. E. Morphey, "Why RPA Implementation Projects Fail," 2019. https://www.cmswire.com/information-management/why-rpa-implementation-projects-fail/ (accessed May 20, 2022).