

# Bibliometric Analysis of Robotic Process Automation Domain: Key Topics, Challenges and Solutions

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**Abstract.** In the era of Industry Revolution 4.0, organizations around the world are continuously looking for new technological breakthroughs that can enhance business process efficiency and reduce the cost of operations. Robotic Process Automation (RPA) has effectively addressed these issues in many different business sectors. RPA is a software application that automates Graphical User Interface (GUI) tasks that were previously performed by human users. However, the current literature in this research is lacking comprehensive bibliometric literature review which can be used to identify the future trend and the latest issues in the RPA research domain. To address these gaps, the objective of this study is to identify the current issues and future trends in the RPA domain. Firstly, a performance analysis of the dataset is performed to understand the future trend of the research domain. Then, the science mapping co-word examination bibliometric data analysis is performed on the selected dataset to identify current issues in this research domain. This work also addresses these issues with a practical evaluation framework for business organizations to effectively exploit the advantages provided by the RPA implementation.

**Keywords:** Industry Revolution 4.0 · Robotic Process Automation · RPA · Intelligent Process Automation · IPA · Bibliometric Literature Review

## 1 Introduction

### 1.1 Background

In the era of Industry Revolution 4.0, business organizations are constantly looking for technological breakthroughs that foster their business growth and reduce operating costs. Such technological breakthroughs also contribute to a country's economic development [1, 2]. Especially during the post-Covid-19 era, organizations need to sustain business in the Volatility, Uncertainty, Complexity and Ambiguity (VUCA) [3] environment whereby it is hard to predict future events for sustaining business.

RPA enables the completion of repetitive tasks more rapidly while freeing up time for human resources for other important tasks that require a higher level of human intelligence [4]. Also, RPA implementation provides significant cost savings, high scalability,

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efficiency, productivity and improved service quality for business operations to gain a competitive advantage [5]. Hence, RPA gain traction in this research domain in recent years and we will discuss this in the following sections.

Despite such high importance, many business organizations, particularly small or medium-sized enterprises (SMEs) lack an in-depth understanding of major RPA components (e.g. issues, software tools, business impact, new topics and methodologies), particularly before implementing RPA projects [6]. Many times, organizations attempt to implement RPA but remain unsuccessful because of the lack of understanding of RPA methodology in synchronizing the human user policy with RPA policy, which results in loss of data [7]. Therefore, this research provides an overview to understand the future trends and current issues in the RPA research domain.

## 2 Literature Summary

In the RPA domain, there are a few bibliometric studies have been done in the past, however, the current literature lacks comprehensive bibliometric data analysis to identify the current issues and future research trends. For instance, one of the attempts made by Afriliana and Ramadhan [8] focused on the digital transformation perspectives of the RPA research domain. Their study offers practices and success criteria for professionals and businesses on how to use RPA to improve their digital workforce. However, one of the major limitations of the study was that it included publications between the years 2017 and 2021 only. Moreover, their work did not identify the current issues and key topics in the RPA research domain.

Another bibliometric study was done by Atanasovski and Toceva [9] on disruptive technologies for accounting. Their findings encourage adaptation and alignment to technological developments by showing that academics and scientific researchers work in the same general direction as practitioners. The study focuses on the predefined categories of accounting disruptive technologies which are RPA, big data, data analytics, cloud computing, artificial intelligence and blockchain, however, their work did not identify the latest issues or keywords in the articles. Also, their work focuses on publications between 2016 to 2020 only.

Besides the above bibliometric studies, a systematic literature review has been conducted by D. Pramod [10] in the RPA domain using PRISMA methodology [11]. Their study shows that RPA has been widely employed in banking and associated industries, with less widespread usage in the healthcare and industrial sectors. A research agenda has been developed by speculating on future paths, but there are still many more opportunities in other disciplines that need to be exploited by leveraging technology. For instance, conducting special focus workshops on healthcare and industrial sectors can create more awareness of these domains. However, their literature review lacks a science mapping method to identify current issues discussed in the RPA research domain.

Another systematic literature review done by Ivančić et al. [12] on RPA Robotic process automation focuses on the categorization of the article documents. Their study offers a summary of RPA concepts and practical applications, as well as the advantages of its adoption in various industries. However, the author's analysis bias also may be accidentally introduced into the review process because it is not done with machine

learning analysis of the articles. Machine learning analysis does not depend on humans to analyze data and is more objective in analyzing data. Also, the years of publication selected is only between 2016 and 2018.

Another systematic literature review is done by Schlund and Schmidt [13] on RPA in Industrial Engineering. Their results highlight the need for the manufacturing and industrial engineering sectors to catch up on research to fully use RPA's potential for future applications. The study classifies five types of the contribution of RPA mainly process planning, planning and scheduling, authoring tasks, robot programming and incident management. However, such pre-defined classifications conducted by the authors themselves may have human biases.

This research was conducted by Rogers and Zvarikova [14] on algorithmic governance powered by RPA for sustainable smart manufacturing with a quantitative literature review using Web of Science, Scopus and ProQuest tools. The methodology selected is Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) and the total number of final selected articles is just 21. However, in this work, the article selection process may be accidentally introduced with human biases.

Hence, to overcome the weaknesses of all the discussed bibliometric studies/reviews, the current study first incorporates publications over a longer period i.e., from the year 1985 until 2022. Second, the current study incorporates more keyword synonyms in the initial search, which results in retrieving a greater number of related publications to encompass the widest possible range of RPA literature. Third, the current study incorporates text mining and co-word examination to identify the latest key topics and issues discussed in the RPA research domain. Following that, we aim to suggest practical solutions for each identified current issue in the RPA domain. And lastly, we use machine methods with science mapping features to remove human biases in data analysis. Using science mapping, we aim to foreground the transition in the RPA research trends over time and determine future research directions.

## 3 Methodology

Referring to Fig. 1. on the research methodology, this work gathers bibliometric data on RPA research for its literature review. This work implements the Scientific Procedures and Rationales for Systematic Literature Reviews (SPAR-4-SLR) protocol, which comprises three major steps which are assembling, arranging, and assessing articles [15]. This work integrates bibliometric analysis methods [16] into SPAR-4-SLR [15] at the assessing phase of the methodology. As illustrated in Fig. 1. The current study adopts standardized and replicable procedures and incorporates two types of bibliometric analysis, (i) Performance analysis, and (ii) mapping text mining and co-word examination at the assessing phase of SPAR-4-SLR. Therefore, bibliometric analysis tools such as VOSViewer [17] or Bibliometrix [18] and be utilized to analyze the selected article data at the assessing phase of SPAR-4-SLR.

To begin with, we chose Scopus which is the largest database of peer-reviewed publications [19]. This ensured the selection of the high-quality and widest range of literature for our analysis. Next, we searched the keyword "Robotic Process Automation" along with several other terms with the same meaning, which are: "software robots",

"intelligent process automation", and "software-based intelligent process automation" in the article titles, abstracts and keywords of documents. Searching with similar terms together resulted in retrieving comparatively a greater number of related publications, thus encompassing the widest possible range of RPA literature. This initial search which was performed on the date of 13th January 2023 revealed 929 documents.

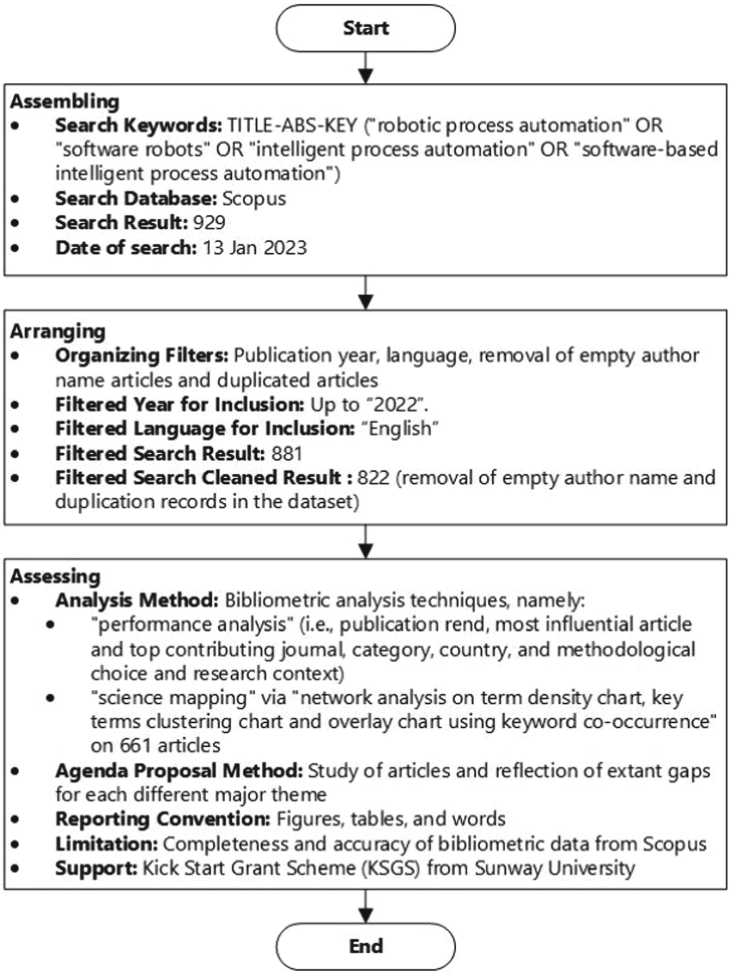


**Fig. 1.** Scientific Procedures and Rationales for Systematic Literature Reviews (SPAR-4-SLR) Protocol [15]

Following the initial search, we included all publication years from the beginning of the RPA research domain (i.e., 1985) until 2022. Since we aimed to analyze the RPA research domain, therefore, our selection criteria are selected to specifically capture all the articles to analyze the latest research trend. Further, we chose articles written in the English language to read and understand the content. After these inclusions, the final number of articles appeared to be 881.

After completing the initial search, we started the data-cleaning process. For that, we exported the CSV file from the Scopus database containing all the bibliometric information of all articles. Before processing further, we first cleaned this system-generated raw file for duplicated records or missing information. This step eliminated documents which were missing the author name and duplicated titles, making our final sample reach 822 articles. After this, the cleaned file was used first in the Bibliometrix [18] bibliometric analysis R software for the performance analysis, and then in VOSviewer [17] software for text mining and co-word examination.

Performance analysis describes how well a research topic is performing over some time [16]. We performed an in-depth performance analysis using the Bibliometrix [18] bibliometric analysis R software and visualized the RPA publication growth from 1985 to 2022. Then, we focus on the latest era and present the documents by subject areas over the last 10 years as well to forecast the future research trend.

Another type of bibliometric analysis that we conducted is the text mining and co-word examination. This is defined as research analysis that concentrates on the textual content of the publications and investigates the past, present, or potential links between key topics in a research field [16]. We conducted this analysis using VOSviewer [17] software and foregrounded the most frequent author keywords and their categorization; such as current issues in intelligent process automation, natural language processing, cognitive automation, deep learning and sustainability. Hence, this science mapping method will identify the current issues in the RPA research domain.

Referring to Fig. 1, the first phase of SPAR-4-SLR is assembled. To assemble in this study is to determine the search terms related to RPA from the preliminary evaluation of pertinent literature to compile the corpus of papers on RPA [15]. Then, the next phase of SPAR-4-SLR is arranged. Arranging refers to the arrangement and cleaning up of literature. The third phase is defined as assessing. The term assessing of SPAR-4-SLR refers to evaluating and summarizing research articles. Therefore, these three phases are the main phases for the SPAR-4-SLR methodology to analyze the published articles on the RPA research domain.

### 3.1 Article Selection

The research methodology of this work is to select a set of RPA domain articles from a reputable research indexing database and then utilize bibliometric software to generate data visualization to identify the current issues and trends in this research domain. The bibliometric research methodology approach had been widely accepted and discussed for literature review study [16]. The detailed steps to conduct the article selection research methodology for this work as below:

**Table 1.** Article Selection Settings

| Selection Criteria | Description |
|---|---|
| Database | Scopus index database only |
| Search Section | Title, abstract and keyword only |
| Keyword Searched | TITLE-ABS-KEY (“robotic process automation” OR “software robots” OR “intelligent process automation” OR “software-based intelligent process automation”) AND (EXCLUDE(PUBYEAR,2023)) AND (LIMIT-TO (LANGUAGE, “English”)) |
| Years | Until 2022 |
| Language | English language articles only |
| Download File | Comma Separated Values (CSV) format |
| Data Cleaning | Remove empty author name records and remove duplicated records |

Referring to Table 1, this study selects the published articles only written in the English language from the earliest article document dated 1985 until 2022 from the Scopus index database. The search keywords are selected based on the title and abstract sections of the article. However, this work excluded the published articles for the year 2023 because the time of writing the journal is during the year 2023 and the 2023 articles data are still in the accumulating process. Hence, only 881 published articles are selected from the Scopus index article database and it is based on the keywords and filtering criteria in Table 1. However, after cleaning the missing author name records and 825 published articles remained in the dataset. The remaining 822 records are checked for duplication and 3 duplication records are found and these records are cleaned.

### 3.2 Bibliometric Visualization Software Settings

This study selected the co-word examination bibliometric data visualization methodology [16] because this methodology can effectively identify current issues in the research domain. Next, this step is to download the selected articles from the Scopus index database website generated Comma Separated Value (CSV) file with the article search criteria in Table 1. The none selected articles will not be included in the CSV. Then, import the download CSV file to VOSViewer bibliometric software [17].

The next step is to proceed with the VOSViewer software [17] according to Table 2 to generate the co-word examination [16] bibliometric data visualization charts. The final step is to conduct a co-word examination bibliometric analysis and proceed with report writing on the obtained results. Furthermore, the Bibliometrix [18] software tool for bibliometric analysis will also be used in the performance analysis to generate descriptive statistic information and bibliometric information of the selected dataset.

**Table 2.** VOSViewer [17] Settings

| VOSViewer Setting | Description |
|---|---|
| Software version | 1.6.18 |
| Choose the type of data | Create a map based on bibliographic data |
| Choose data source | Read data from bibliographic database files |
| Select files | Scopus |
| Type of Analysis | Co-occurrence |
| Unit of Analysis | Author keywords |
| Counting method | Full counting |
| Choose threshold | The minimum number of occurrences of a term is 3 |
| Choose a number of terms | The number of terms to be selected is 139 |

## 4 Performance Analysis

A bibliometric analysis method called performance analysis describes how well a research topic is performing [16]. This section discusses the performance analysis of the selected article documents from the Scopus index database based on the search criteria in Table 1. The objective of this section is to understand the context of the dataset by using data visualization before interpreting the bibliometric information in the following section.

### 4.1 Overall Publication Documents Over Time

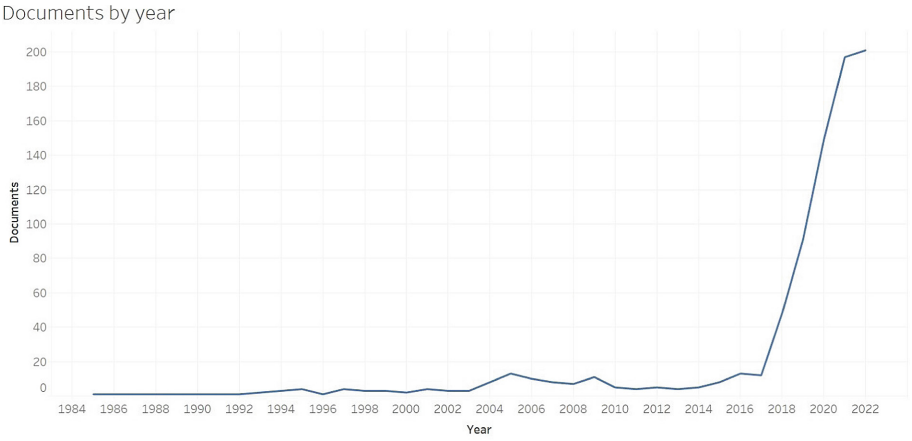


**Fig. 2.** Overall Publication Documents Count Over Time Chart

The Fig. 2. Line chart illustrates this research domain key terms such as "software robots", "intelligent process automation" or "software-based intelligent process automation" being introduced as early as 1985 to 2022. However, this research domain did not gain much attention in its early years. Then, recently this research domain started to gain exponential growth in terms of research article publication total count around the year 2017 until 2022. These phenomena show the recent RPA technology interest and acceptance in both research and business communities.

Initially, the research field is defined as software robotic for software-based automation research. Then, the term Robotic Process Automation (RPA) was first coined by Blue Prism for the business service's lexicon started in 2012 [20]. However, the actual growth of the RPA research domain research article published in the year 2017 is only visible after 5 years from the initial definition of the RPA term. In summary, this RPA research domain is still on its uptrend growth in terms of article publication.

### 4.2 Publication Documents by Subject Area Over the Last 10 Years

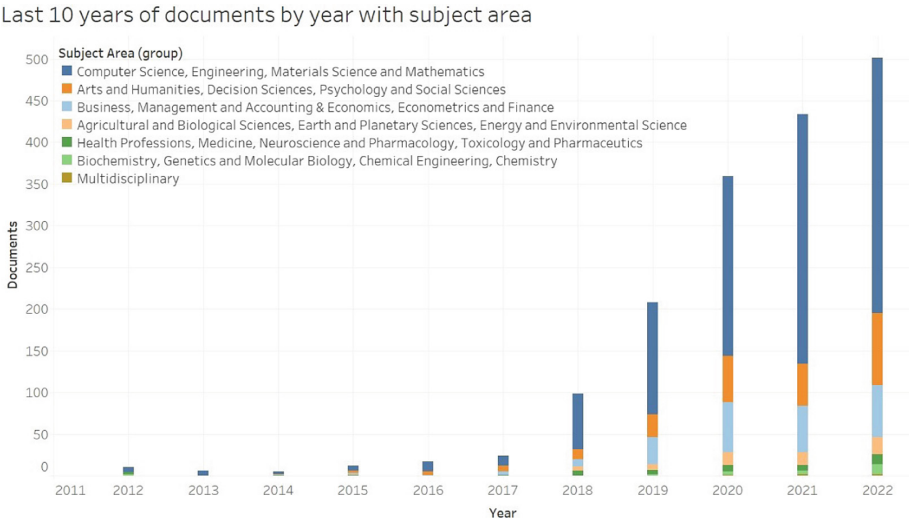


**Fig. 3.** Publication Documents by Subject Area Over the Last 10 Years

Referring to Fig. 3. The bar chart explains the different research subject areas and categorized them into the stacked bar chart over the last 10 years. The last 10 years of data are selected based on Table 1 search criteria for data visualization because the significant changes can be observable visually on the chart. The subject areas are grouped for ease of data visualization.

The Fig. 3. Bar chart shows the computer science and engineering research subject areas are the leading areas in this research domain throughout the last 10 years. The chart shows the significant upward growth trend of these disciplines in this research domain. The reason is artificial intelligence, machine learning and software robot automation in

RPA are related closely to computer science and engineering disciplines. These disciplines are part of the Industry Revolution 4.0 [21] agenda to promote business process automation and digitization of organizations.

Next, business domain research subject areas such as management and accounting, economics, and finance research ranked the second highest research contribution in this RPA research domain. Some of the reasons that this research domain gained interest from the business industry are reduced personnel expenses, improved operational effectiveness, accuracy, and availability of services around-the-clock [22]. Therefore, Fig. 3. Bar chart shows the business domain publication contribution leads in second place in this article dataset for the last 10 years.

Furthermore, psychology and social sciences subject areas are also gaining progress as the third highest contributor in this research domain. If the project did not implement change management when introducing RPA to the users then users' acceptance of business process automation will be low [23]. Some of the factors users accept RPA software robot's integration positively are social influence, work relevance and demonstrating results to the stakeholders [24]. Therefore, psychology and social sciences subject areas are important factors in the RPA domain.

Moreover, Fig. 3. Chart shows recently during the years 2020 and 2022, a new emergence of a multidisciplinary section is shown in the chart. This is motivated by the research community's interest in multidiscipline publication in the RPA research domain that triggered the new multidiscipline phenomenon that started to gain attention recently. In short, the RPA research trend is growing and vibrant in different subject areas and is supported by diverse disciplines of research communities.

## 5 Science Mapping

### 5.1 Co-word Examination Bibliometric Analysis

Science mapping is an examination that reveals and presents a visual depiction of the information that is currently available and how it is connected to other knowledge in a certain subject [16]. The co-word examination bibliometric analysis [16] is defined as research analysis work that concentrates on the textual content of the publication itself and investigates the past, present, or potential links between subjects in a research field. Some examples of co-word examination applications in research are [25–29]. The co-word examination bibliometric analysis is a method used in this work to identify the current issues that arise in the research domain with the bibliometric data visualization software tools.

In contrast to citation analysis, co-citation analysis, and bibliographic coupling [16], which use either cited or citing publications as a basis for their analyses, this work only focuses on co-word examination bibliometric to analyze the potential links between author's text keywords in the "article titles", "keywords" and "abstracts" sections. This work selected co-word examination bibliometric analysis because this method can identify the current issues and related keywords in the RPA research domain effectively.

Referring to Fig. 4 and 5, key terms clustering visualization chart, the bigger term label size display is used to identify which terms in this research domain have the highest frequency of occurrence across the selected article dataset. The bigger size key term

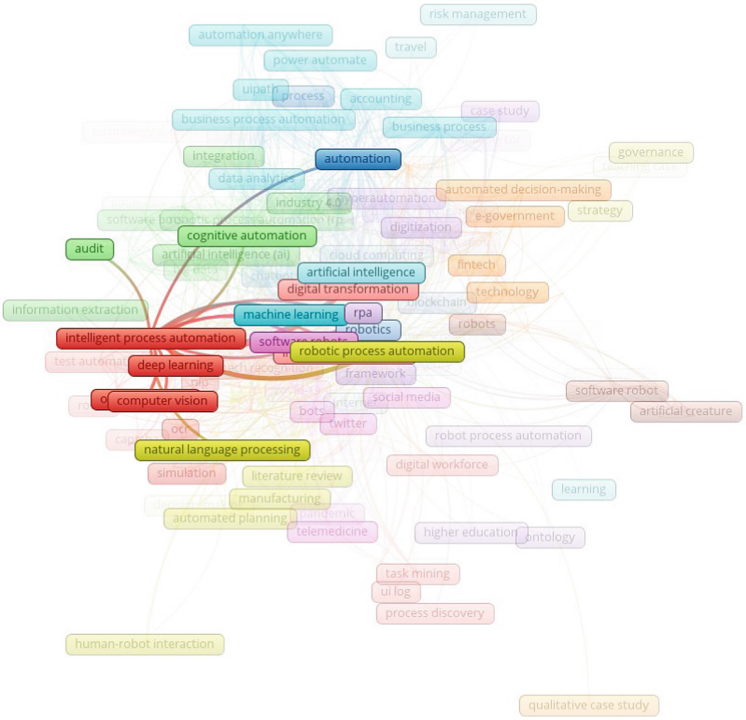


**Fig. 4.** Natural Language Processing + Intelligent Process Automation and Intelligent Process Automation + Cognitive Automation Clustering Visualization Chart

labels indicate the higher term frequency used across all the selected articles dataset. On the other hand, the smaller size key term labels indicate the low term frequency used in the dataset. The term density data visualization effectively shows the related common words used in the title, keywords and abstract across the selected article dataset.

Referring to Fig. 4 and 5. All are based on the experiment settings in Table 2, The VOSviewer software [17] network visualization feature identified 13 different clusters discussed in the selected article dataset. In summary, the thin line connection between these keywords in different clusters indicates there are only a few investigations on these areas from the different clusters and potentially it may lead to promising multidisciplinary research in these clusters. We will discuss more details on the relationship between each of these keywords in the next section.

### 5.2 Overlay Visualization Analysis on Current Issues

The generated overlay co-word examination bibliometric data visualization chart will be discussed in this section. The latest emerging topics of interest are labelled with a yellow label and the old topics are labelled with a dark blue label in the chart. The objective of this section is to select the current issues in the RPA research domain that is colored in yellow/green (current issues) in the different cluster for analysis and discussion. The




**Fig. 5.** Deep Learning + Sustainability Clustering Visualization Chart

selected current issues (yellow/green label) with little investigation work (thin line of connection between labels) from different clusters (different colors of labels) may lead to potential high-value multidisciplinary research.

The Fig. 6. Overlay chart shows the current issues in the RPA research domain. Our study investigates the current state of research in intelligent process automation and identifies any urgent situations arising from a lack of responsiveness to the needs of natural language processing. To achieve this, VOSViewer software computes the occurrence of keyword terms in the author's keywords of selected articles. Figure 6. Provides an overview of the terms and their interconnectivity, with term size representing the frequency of occurrence and the thickness of connecting lines reflecting the frequency of co-occurrence between two terms [30].

In Fig. 6., it could be seen that one of the most recently emerging terms that authors have used is 'intelligent process automation'. Furthermore, the term 'intelligent process automation' has a thin connecting line with the term 'natural language processing'. This means that fewer authors are recently giving focused on these different research cluster's topics which are intelligent process automation and natural language processing that

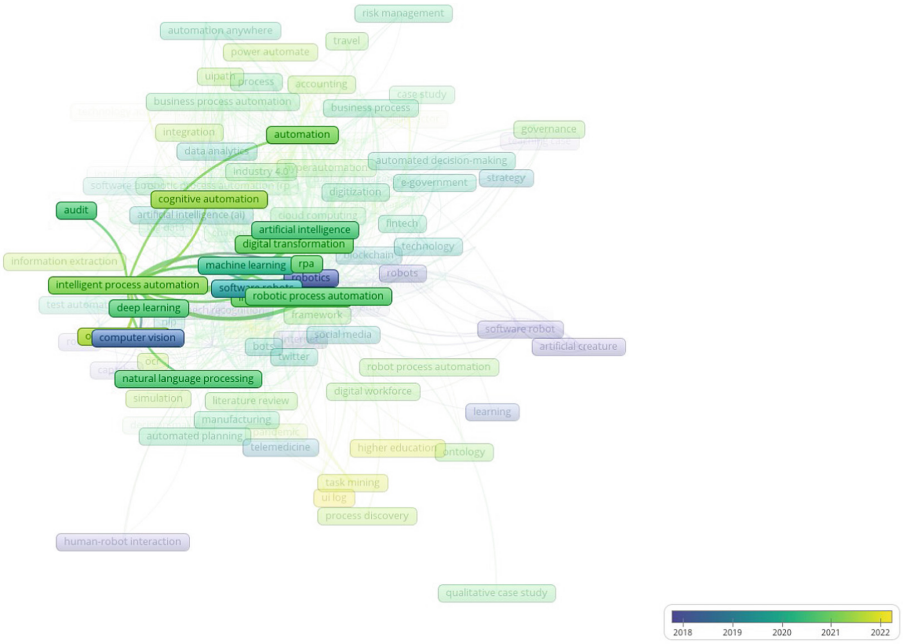


**Fig. 6.** Intelligent Process Automation + Natural Language Processing and Intelligent Process Automation + Cognitive Automation Current Issues with Overlay Chart

have huge potential in multidiscipline research. This raises the question: what is the problem with intelligent process automation that contributes to natural language processing, particularly in the context of RPA? To answer this, there are wide technical capability gaps that exist in intelligent process automation [31] and natural language processing [32], which enable the implementation success of RPA projects for automating difficult business processes that require human intelligence to process the natural language text information. For example, intelligent process automation applications of RPA projects such as using natural language processing [32] automate the daily business transaction to each manual task to improve the efficiency of the business transaction. If businesses would not respond timely and delay the new opportunity of implementing natural language processing into their intelligent process automation for their RPA project, their prospective users may lose many opportunities to automate the unstructured text data business processes for operation cost saving.

Furthermore, the term 'intelligent process automation' has a thin connecting line with the term 'cognitive automation'. This means that fewer researchers are recently giving few attentions to these different research cluster's topics which are intelligent process automation and cognitive automation that may have huge multidisciplinary research opportunities. Cognitive automation is defined as machine learning facilitated business process automation (BPA) [33]. This raises the question: what is the problem with intelligent process automation that contributes to cognitive automation, particularly in the context of RPA? To answer this, there are wide technical capability gaps that exist in

intelligent process automation [31] and cognitive automation [34], which enable successful RPA project implementation for automating business process tasks that require human intelligence to discover the possible business processes that need automation. For example, intelligent process automation applications of RPA projects such as cognitive automation [34] structure data, drive existing business models and create value between legacy industries. If a business could not engage timely and missed the new opportunity of implementing cognitive automation into their intelligent process automation for their RPA project, their prospective stakeholders may suffer from a lack of opportunity to automate the business process that is not able to be detected by human users.

In Fig. 7., the term 'Deep Learning' has a thin connecting line with the term 'Sustainability'. This means that few researchers are recently giving focused on these separated topics which are deep learning and sustainability of RPA technologies that may lead to possible multidisciplinary research outcomes. This raises the question: what is the problem with deep learning that contributes to the sustainability of RPA technologies? To address this, there are research discussions on deep learning in the RPA domain [35] and its sustainability adoption implementation in business, which indicate the success of the RPA project. For example, in this research [36] RPA adoption in businesses and its impact on user adoption and software application sustainability in the domain of the services industry. Deep learning capability will increase the application adoption sustainability. If businesses could not adopt timely and missed the opportunity of implementing deep learning into their RPA project, their prospective stakeholders may not view the RPA project as sustainable for their business.

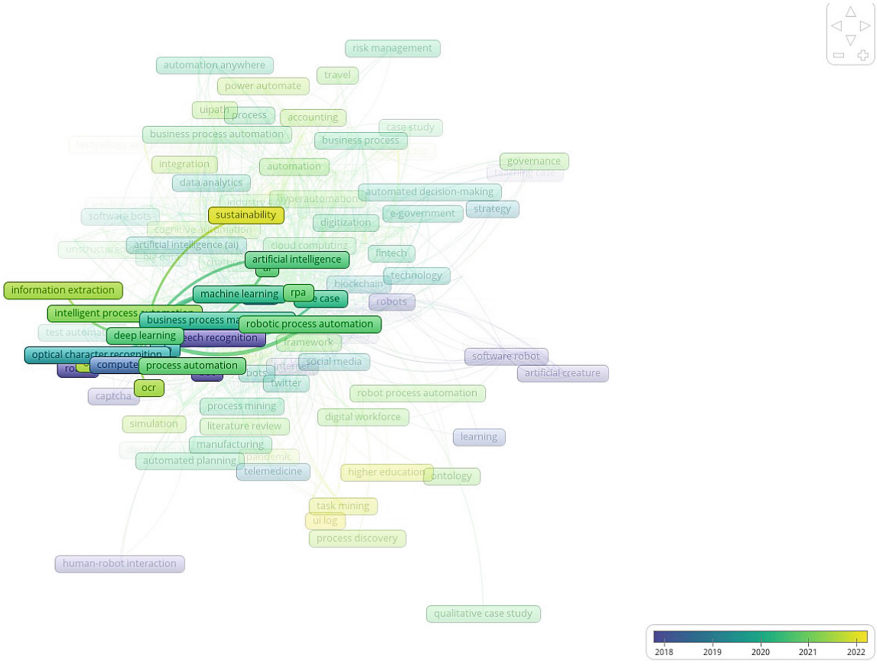


**Fig. 7.** Deep Learning and Sustainability Current Issues with Overlay Chart

## 6 Discussions

This section discusses the contribution of this work towards the research gaps in the literature. This work addressed the author analysis bias that may be introduced accidentally during the literature review process. The methodology utilized bibliometric analysis literature review methodology in this work utilizes machine learning clustering algorithms to analyze the selected dataset without introducing human error or biases in the process.

Firstly, this bibliometric study [8] focused on the RPA research domain's viewpoints on digital transformation. We address the research gaps with a bibliometric analysis from the year 1985 to 2022 with more years of selection for a comprehensive understanding of the research domain. Additionally, this effort included new keyword synonyms with related search parameters, increasing the number of relevant articles that could be retrieved for the study's completion. In this study, we were able to pinpoint the change in the research from software robots to RPA in the articles, and as a result, we were able to provide a more comprehensive picture of the whole research area. Additionally, the co-word analysis is used to pinpoint the most recent hot themes and difficulties the RPA research sector is facing.

Secondly, this article [9] is research on disruptive technology in accounting that uses bibliometric analysis. To successfully find the newest keywords in the RPA study area without being constrained by the author's predetermined categories of keywords, this work employs a co-word analysis to fill this research gap. Additionally, the publications between 2016 and 2020 are the subject of this investigation. These research gaps will be filled over a longer period using search parameters that include additional keywords and synonyms to find more publications that are relevant to the RPA domain.

According to this study [10], RPA has enhanced operational effectiveness and productivity in the banking industry and its related businesses while being used less frequently in the healthcare and industrial sectors. The PRISMA approach is dependent on the author's analytical work, which has the potential to incorporate biases into the data analysis during the review process. Additionally, the literature assessment of the RPA research area does not have a scientific mapping tool to highlight current problems. For every issue that this study highlighted as a present problem, we filled up these gaps with workable remedies.

With a thorough examination of the literature, this study [12] on RPA Robotic process automation focuses on categorizing the article papers (SLR). Because the review method does not utilize machine learning to analyze the papers, analytical bias might nevertheless unintentionally enter the process. Additionally, the chosen publishing years are limited to those between 2016 and 2018. We filled in these research holes by adding new keyword synonyms and extending the publication date range. A scientific mapping component is needed to identify the current issues in the RPA research domain's literature assessment. We filled up these gaps with workable answers for every current issue that our study identified as a current concern.

Using the systematic literature review (SLR) technique, another study of the literature on RPA in industrial engineering was conducted [13]. Four categories of RPA contributions are categorized by the systematic literature review research, including process planning, planning and scheduling, writing tasks, robot programming, and incident management. However, as the authors themselves carry out this pre-determined categorization, biases may unintentionally enter the review process. With a bibliometric literature review approach, this study fills the research gap that might be caused by human biases or errors and replaces them with machine learning techniques.

## 7 Practical Implications

The practical implication of this study for a business organization is to provide a practical solution before venturing into RPA implementation. The business organization will be benefited from the higher success rate of RPA implementation of risks and benefits are carefully taken into consideration when venturing into RPA implementation. Below is the list of practical implications for adopting RPA into businesses:

- Natural language processing will enable wider business process automation.
- Cognitive automation will provide more efficient business process automation.
- Deep learning with sustainability consideration will allow long-term benefits.

## 8 Conclusions

This work investigates the bibliometric literature review for 36 years from 1985 until 2022. This study identified that this research domain gained traction over the last 10 years and recently in the year 2017 it showed exponential growth in research article contributions. Also, there is a new emergence in multidisciplinary RPA research in recent years between 2020 and 2022. One of the reasons for many emerging RPA multidiscipline research is gaining attention is because RPA involves a wide range of disciplines such as computer science, business, management, accounting, human resources, customer relationship management, engineering, chemistry, health sciences, social science, decision science, etc. Therefore, the research article publication contribution in this research domain is still on its upward trend.

In summary, the key factor for successful RPA project implementation is to adopt more of the latest technologically advanced tools that automate business processes that is previously done by humans (e.g. natural language processing). Therefore, human expertise can be focused on other important tasks to save operation costs to enable widespread RPA adoption and acceptance from the project's stakeholders. Hence, the RPA project can be viewed as a sustainable long-term solution and a competitive advantage for businesses in the challenging VUCA market environment.

## 9 Limitations and Future Works

This work covered a wide range of different research subject areas across the RPA research domain. This study aims to understand the overview of the RPA research domain in terms of co-word examination bibliometric literature review and to understand the current challenges faced in this research domain. However, this study has not

utilized advanced machine learning techniques such as deep learning for RPA bibliometric literature review. Hence, future work will be focusing on advanced machine learning techniques to discover hidden data patterns and hence will enable more in-depth study of the research domain.

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