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Robotic Process Automation: a systematic literature review

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TECNOLOGIAS
E ARQUITETURA

Department of Information Science and Technology

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Resumo

Neste trabalho de dissertação, realiza-se uma análise extensiva do cenário de pesquisa em *Robotic Process Automation* (RPA) aplicada no âmbito empresarial. O estudo visa detetar os temas primordiais, as tendências de investigação emergentes, os autores de maior influência e as revistas de destaque no domínio da RPA. Para tal, utilizou-se o software VOSviewer na execução de uma análise bibliométrica de um conjunto de 118 artigos retirados de bases de dados escolhidas. Esta análise abrangeu múltiplas avaliações de dados que incluíram a análise de co-autoria, análise de citações, análise de acoplamento bibliográfico e análise de coocorrência. Como resultado, descobriu-se que países como os Estados Unidos, o Reino Unido, a França, o Canadá e a Austrália têm dado contribuições significativas no campo da RPA. Além disso, a análise dos principais artigos mais citados salientou o papel transformador do RPA na otimização de processos, na melhoria da eficiência e na promoção da transformação digital. A fusão da RPA com estratégias orientadas para o cliente, tecnologias digitais, tais como *Big Data Analytics* (BDA), e práticas de liderança emergentes foram identificadas como elementos-chave na entrega de serviços personalizados, melhorando a experiência do cliente e fomentando o sucesso organizacional. Com este trabalho, aprofunda-se a compreensão do cenário de pesquisa da RPA, oferecendo perspetivas para as pesquisas futuras e a definição de políticas em suporte aos pesquisadores e profissionais que atuam neste campo em rápida evolução.

Keywords: Robotic Process Automation (RPA), aplicações de negócio, análise bibliométrica, análise de coautoria, análise de citações, análise de acoplamento bibliográfico.

JEL Classification: M15, O33, O34.

Abstract

In this dissertation work, an extensive analysis of the research scenario in Robotic Process Automation (RPA) applied in the business scope is conducted. The study aims to detect primary themes, emerging research trends, influential authors, and prominent journals in the field of RPA. For this purpose, the VOSviewer software was used to perform a bibliometric analysis of a set of 118 articles extracted from selected databases. This analysis encompassed multiple data evaluations, including co-authorship analysis, citation analysis, bibliographic coupling analysis, and co-occurrence analysis. As a result, it was found that countries such as the United States, the United Kingdom, France, Canada, and Australia have made significant contributions in the field of RPA. Furthermore, the analysis of the of the main most cited articles highlighted the transformative role of RPA in process optimization, improving efficiency, and promoting digital transformation. The fusion of RPA with customer-oriented strategies, digital technologies such as Big Data Analytics (BDA), and emerging leadership practices were identified as key elements in delivering personalized services, enhancing customer experience, and fostering organizational success. With this work, a deeper understanding of the RPA research landscape is achieved, providing insights for future research and policy formulation, to support researchers and professionals working in this rapidly evolving field.

Keywords: Robotic Process Automation (RPA), business applications, bibliometric analysis, co-authorship analysis, citation analysis, bibliographic coupling analysis.

JEL Classification: M15, O33, O34.

Index

Index of Tables vi

Index of Figures vii

1. Introduction 1

2. Methodology 2

2.1 Planning the Review 2

2.2 Need for the Review 3

2.3 Research questions and research objectives 4

2.4 Review protocol 4

2.5 Definition of Inclusion and Exclusion Criteria 6

2.6 Conducting the Review 7

2.7 Selection of Studies 7

2.8 Data evaluation 8

3. Bibliometric analysis 9

3.1 Co-authorship - Countries 10

3.2 Citation – Sources 14

3.3 Bibliographic Coupling – Documents 16

3.4 Co-occurrence – All keyword 19

3.5 Analysing the main articles with the highest number of citations 22

4. Discussion and Findings 28

4.1 Organization of Knowledge 28

4.2 Main Issues, Debates, and Lines of Research 30

4.3 Main Authors, Journals, and Geographies 31

4.4 Main Publications, Citations, and Keywords 32

4.5 Interpretation of Findings and contributions.....33

5. Conclusion.....34

6. Limitations.....36

7. References 38

Index of Tables

Table 1 - SLR steps performed....3
Table 2 - list of keywords searched in repository....5
Table 3 - inclusion/exclusion criteria....6
Table 4 - filtering process....8
Table 5 - Analytical methods of VOSviewer....9
Table 6 - Clusters of Co-authorship – Countries....10
Table 7 - Top 5 countries based in Total Link Strength....11
Table 8 - Top 5 countries with most documents, and their average publication year....12
Table 9 - Top 5 countries with higher Average Citations....13
Table 10 - Top 5 journals with most documents published.....15
Table 11 - Top 5 most cited documents....17
Table 12 - Top 5 most co-cited documents....18
Table 13 - Co-occurrences' clusters....19
Table 14 - Top 5 most recent keywords, in average publication year....21

Index of Figures

Figure 1 - RPA Google Trends.....5
Figure 2 - Average Publication Years.....12
Figure 3 - Average Citations.....13
Figure 4 - Cited Journals.....15
Figure 5 - Authors with most cited documents.....16
Figure 6 - Authors with the strongest links.....17
Figure 7 - Co-occurrences between keywords.....20
Figure 8 - Top 5 Keywords in terms of occurrences.....20
Figure 9 - Co-occurrences, with average publication years.....21

1. Introduction

Companies have increasingly turned to Robotic Process Automation (RPA) in an effort to boost productivity and diminish costs in recent years. It's been noted that RPA technology aids the implementation of strategic plans, helping organizations maintain competitiveness in markets where labour costs are on the decline (Rutschi & Dibbern, 2020). However, alongside the multitude of advantages RPA adoption offers, it also carries certain risks and challenges. Therefore, it's vital to comprehend the potential risks and opportunities involved in RPA deployment, particularly with regards to efficiency, service quality, and risk management and compliance (Chacón-Montero et al., 2019).

Despite the surge in interest and practical applications of RPA, there's a notable gap in academic literature concerning its definition, areas of application, and commonly used commercial applications. The body of literature is divided between commercial and scientific perspectives, potentially hindering the academic progression in the field (Enriquez et al., 2020). Another void in the literature is the absence of explicit descriptions regarding processes suitable for automation and the criteria for making such decisions (Herm et al., 2022) and misjudgement in selecting processes for automation has been identified as a leading cause of RPA technology implementation failure (Sobczak, 2022).

The main issue at hand is the limited understanding of the structuring, definition, domains, debates, research trajectories, prominent authors, and seminal studies in RPA's realm; conducting a systematic literature review and bibliometric analysis on RPA could bear significant relevance for both academic and industrial spheres. This study specifically aspires to discern the chief topics, knowledge domains, and clusters, pinpoint key issues, debates and research lines, identify leading authors, journals, and geographic regions, and recognize the primary publications, citations, and keywords within the RPA field. The results of this study carry substantial implications, as they will offer critical insights to practitioners and policymakers regarding the current knowledge state, thereby informing decision-making processes around RPA implementation. Moreover, it can guide researchers in aligning their efforts with the most salient and relevant research questions.

The research will unfold as follows: the methodology, detailing the distinct research steps, the process of identifying relevant literature, applying filters and criteria, and performing data extraction and summarization, will be introduced in the second section. The third section will report

the study findings. Finally, the last section will bring forward the conclusions, study limitations, and future directions.

2. Methodology

To gain a comprehensive and profound understanding of the current research landscape in robotic process automation (RPA), a two-fold approach will be employed. Firstly, a bibliometric analysis will be conducted, involving a critical evaluation and synthesis of existing research through the examination of referenced articles. This analysis will be complemented by a literature review of the main most cited articles, ensuring a comprehensive and objective assessment of the state of the art.

For the systematic literature review (SLR) and acquisition of relevant bibliography, a methodological framework inspired by the recommendations of Kitchenham & Charters (2007) and supplemented by Webster & Watson (2002) will be adopted. This methodology facilitates a thorough and unbiased assessment of the research topic by reviewing previous studies, identifying research gaps, and establishing a foundation for future investigations.

By combining the insights derived from the bibliometric analysis with the findings of the literature review, an extensive and rigorous examination of the existing literature on RPA will be achieved. This comprehensive review will not only identify the principal topics and knowledge domains but also shed light on the key issues, debates, lines of research, influential authors, reputable journals, geographic distribution, publications, citations, and prevalent keywords. Moreover, this synthesis will contribute to the advancement of the field by pinpointing critical gaps and proposing directions for future research.

2.1 Planning the Review

The necessity for the review, the design of the review procedure, and the specification of the research questions are all covered in this part, which forms the first phase of the SLR process, as described in the table below.

Table 1 *- SLR steps performed*

Planning the Review	Conducting Systematic Literature Review	Reporting the Review
Need for the Review: - lack of knowledge of how literature is organized, and defined - unclear idea of evolution and current state of progress and maturity	**Selection of studies** - 118 articles	**Summarization of Extracted Data** - Synthetize data
Objective of the review - Gather available research information about state-of-art of RPA technology	**Extraction & Data Analysis** - Sample characteristics.	**Reporting of the Findings** - Answer the proposed research questions.
Review protocol - Search string, filters, repositories, and inclusion/exclusion criteria.		

2.2Need for the Review

The preliminary results of the literature review highlighted a gap in the literature regarding the definition, application areas, and most common commercial applications of RPA. Additionally, the literature is polarized between commercial and scientific aspects, which might pose a challenge to the field's academic advancement. Identifying the main topics and knowledge domains and clusters, as well as the main issues, debates, and lines of research, will provide insights to practitioners and policymakers on the current state of knowledge in the field, which can inform decision-making regarding the implementation of RPA. Moreover, identifying the main authors, journals, geographies, publications, citations, and keywords will allow researchers to focus their efforts on the most important and relevant research questions and areas of study.

2.3 Research questions and research objectives

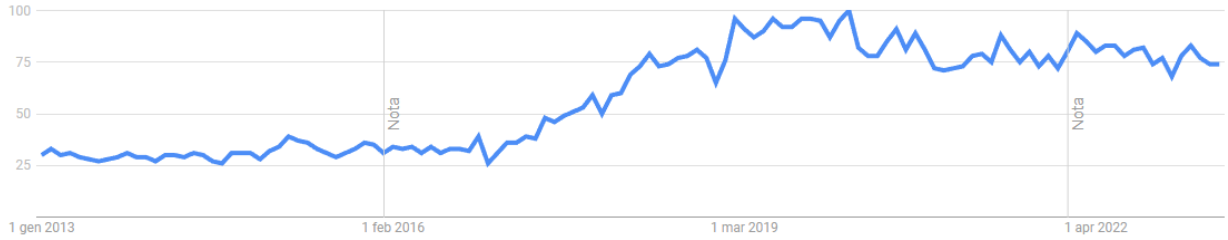
This paragraph explains the research questions and objectives for a systematic literature review and bibliometric analysis on Robotic Process Automation (RPA). The primary research question, **RQ1**, aims to understand how knowledge in the field of RPA is organized, while the sub-research question, **RQ2**, seeks to identify the main issues, debates, and lines of research in the field. **RQ3** aims to identify the main authors, journals, and geographies in RPA, while **RQ4** aims to identify the main publications, citations, and keywords related to RPA. The research objectives (**ROs**) for RQ1-4 correspondingly aim to understand the main topics and knowledge domains and clusters, identify the main issues, debates and lines of research, identify the main authors, journals and geographies, and identify the main publications, citations and keywords in the field of RPA.

2.4 Review protocol

This section aims to provide a comprehensive overview of the methodology employed to gather relevant literature for conducting a bibliometric analysis and subsequent literature review. The meticulous process commenced with conducting searches on a selected database, followed by a systematic reduction of the retrieved bibliography. This reduction was based on the presence of keywords in the title, abstract, and keywords sections of the articles. Ultimately, inclusion/exclusion criteria were applied to refine the search parameters exclusively to articles published in scholarly journals after 2013.

Notably, a careful examination of Google Trends data revealed a significant shift in the prominence of the topic of Robotic Process Automation (RPA) from 2013 onward, with a remarkable surge observed in the second half of 2018 through the present (Santos et al., 2020) . Consequently, for the bibliometric analysis, only articles published between 2013 and May 21, 2023, the date of the research, were taken into consideration. This approach ensures that the investigation encompasses the most up-to-date and relevant literature in the field.

Figure 1 *- RPA Google Trends*



Drawing upon the research questions and subject-specific knowledge, the iterative process of refining the string search was undertaken. A concerted effort was made to employ increasingly specific search terms in order to capture a comprehensive range of articles relevant to the study. The refined and optimized search string, meticulously crafted, is presented below as the culmination of this methodological progression.

Table 2 *- list of keywords searched in repository*

Keywords
"Robotic Process Automation" OR "Intelligent Process Automation" OR "Service Automation" OR "Virtual Workforce" OR "Software Robots"

Significantly, the term "RPA" was deliberately excluded from the search query, as it would have yielded an overwhelming number of results—nearly 30,000 hits—due to the alternative reference of Recombinase Polymerase Amplification in the domain of DNA chemistry. However, all relevant papers encompassing the desired scope were still captured in the search results, even in the absence of the term "RPA."

In order to secure the retrieval of relevant and impactful literature, a comprehensive search was conducted utilizing the SCOPUS database. This electronic library was deliberately chosen as the primary repository for both the bibliometric analysis and the systematic literature review (SLR) due to its extensive coverage of scholarly articles within the field of business and computer science.

2.5 Definition of Inclusion and Exclusion Criteria

For this academic dissertation, specific criteria were established to identify relevant literature in the field of robotic process automation (RPA). The goal of these selection parameters was to locate studies that directly engaged with RPA and contributed meaningful insights to at least one research question. This meant that works were considered for inclusion if their titles, abstracts, or keywords contained terms such as robotic/intelligent/cognitive process automation, virtual assistant, process intelligence, business process model automation, intelligent business process management, or software bot.

Conversely, the exclusion criteria were designed to eliminate pieces that did not align with the research questions. Materials not written in English were removed, along with non-scientific articles, master's theses, web content, and any works that necessitated a monetary exchange for access. By utilizing these rigorous selection standards, the process ensured the inclusion of papers closely linked to RPA and business-related topics, and beneficial to the research questions, while simultaneously dismissing unsatisfactory contributions.

Table 3 *- inclusion/exclusion criteria*

Inclusion/Exclusion Criteria
Academic Articles
Articles in English
Articles published since 2013
Subject area: business

Given that RPA is a relatively unexplored research field, its evolution has been significantly propelled by industrial advancements. Consequently, it was decided to focus the search on articles related to the business world, without imposing any additional stringent quality assessment criteria. This approach sought to maintain a broad reach and avoid unjust exclusion of valuable contributions. The selection parameters applied were successful in identifying relevant studies, with a piece needing to satisfy all inclusion criteria, and its exclusion being triggered by failing to

meet just one of the rejection parameters. This balanced selection approach facilitated the inclusion of appropriate papers and ensured a comprehensive coverage of the research.

2.6 Conducting the Review

In this part we cover the implementation of the review process and the analysis of the retrieved data, which is the second step of the SLR methodology.

2.7 Selection of Studies

To gather the relevant literature, various filters were applied during the search process. Initially, a broad search was conducted without filters to determine the total number of documents available. Subsequently, a keyword search was performed only in the title, abstract, keywords and articles with restricted access or those that did not focus on RPA were eliminated.

The study was conducted from January to May 2023 and employed an advanced survey that utilized various search terms and filters from the selected data source. The initial search yielded 4987 results, but not all were deemed relevant, and specific filters were used to exclude unrelated results. These filters included 'Title, abstract, keywords: "Robotic Process Automation" OR "Intelligent Process Automation" OR "Service Automation" OR "Virtual Workforce" OR "Software Robots"' and 'Document Type: Academic article. Only articles in English that were freely accessible were considered in this dataset. To ensure replicability and relevance, the analysed dataset covered a period from 2013 to 2023.

After the data collection and selection process, 118 articles were identified for bibliometric analysis. The data of the article were exported to a Microsoft Office Excel file and then visualised and analysed using VOSviewer to create bibliographic networks. A detailed description of this process can be found in Table 4.

***Table 4** - filtering process*

Database	Keywords	Initial	In the title, abstract, keywords	I/E criteria
Scopus	"Robotic Process Automation" OR "Intelligent Process Automation" OR "Service Automation" OR "Virtual Workforce" OR "Software Robots"	850	1393	118

2.8 Data evaluation

This chapter offers a snapshot of the bibliometric scrutiny performed on the 118 papers harvested from the selected databases. It was used VOSviewer, a text mining application, to create and visualize bibliometric networks. This software is an instrument for recognizing main keywords, influential contributors, and standout journals in a specified field. VOSviewer integrates various analytical and counting techniques, which can be mixed and matched based on the nature of the analysis selected.

VOSviewer employs co-occurrence analysis to inspect the rate at which two or more terms appear simultaneously in the same document or citation. In addition, the software is capable of executing bibliographic coupling analysis to gauge the extent of shared references between two documents, and co-citation analysis to quantify how often two documents are cited jointly in the literature. VOSviewer can also carry out keyword analysis to pinpoint the most frequently appearing terms in a set of documents, and cluster analysis to group documents based on their similarities concerning their co-occurrence patterns.

The application of VOSviewer in this investigation enabled the construction of a bibliometric network that discloses the intellectual structure of the RPA field. By examining the bibliometric network, the study could identify the primary themes, research tendencies, and influential authors in the field and then it could create a path that could serve to direct future research, advise policymakers, and equip practitioners with information about the current state-of-art in the RPA field. The various types of analysis possible through VOSviewer are presented in the table below:

Table 5 - *Analytical methods of VOSviewer*

Type of analysis	Unit of Analysis
Co-authorship	Authors, Organizations, Countries
Co-occurrence	All Keywords, Author Keywords, Index Keywords
Citation	Documents, Sources, Authors, Organizations, Countries
Bibliographic coupling	Documents, Sources, Authors, Organizations, Countries
Co-citation	Cited References, Cited Sources, Cited Authors

An array of data analysis was executed to procure comprehensive insights into the research landscape. These scrutinises encompassed publication years, nations of publication, affiliated institutions, influential contributors, top publishing sources, most cited keywords, knowledge area clusters, and bibliographic coupling of frequently cited articles. The "co-authorship - countries" query in VOSviewer supplied data on the nations of publication, while the "co-authorship - authors" query pinpointed the most relevant contributors for the investigation. To recognize the top 5 publishing sources, the "Citation - sources" query was used. The most frequently cited keywords were determined through the "Co-occurrence - All Keywords" query, and knowledge area clusters were identified accordingly. Lastly, the "Bibliographic coupling - Documents" query in VOSviewer facilitated the scrutiny of bibliographic coupling among the main most cited articles in the databases.

3. Bibliometric analysis

The objective of this section is to introduce and dissect the data drawn from the chosen sample results, as detailed in the preceding section. The software, VOSviewer, was utilized to craft graphical illustrations based on the following factors: chronology of publication, dominance of geographic regions in the literature, pinpointing the most significant organizations, authors, and sources of publication, crucial notions and keywords, linkages between selected articles, and dominant research trajectories. The following charts will provide a thorough and detailed understanding of the chosen literature, which will be crucial for deriving conclusions and perspectives in the subsequent sections of the thesis.

3.1 Co-authorship - Countries

The "Co-authorship - Countries" performed using VOSViewer's output led to the formation of 14 unique clusters, containing 26 countries, but it is important to acknowledge that this analysis does not encompass all countries connected with RPA-related articles, as a minimum of 2 documents was a prerequisite for establishing a cluster. The objective of this examination is to pinpoint the nations that have made a marked impact in the sphere of robotic process automation (RPA), considering both individual and joint endeavours.

Table 6 - *Clusters of Co-authorship – Countries*

Cluster 1	Finland
	Germany
	Hungary
	Switzerland
Cluster 2	Australia
	Netherlands
	United Kingdom
Cluster 3	China
	Colombia
	United States
Cluster 4	Bulgaria
	Czech Republic
Cluster 5	Canada
	France
Cluster 6	Jordan
	United Arab Emirates
Cluster 7	Malaysia
	Singapore
Cluster 8	Taiwan
	turkey
Cluster 9	Hong Kong
Cluster 10	India
Cluster 11	New Zealand
Cluster 12	Poland
Cluster 13	Portugal
Cluster 14	South Korea

The United States of America (USA), United Kingdom (UK), France, Canada, and Australia were identified as the top 5 countries when considering total link strength, signifying collaboration, and citations. Interestingly, India, despite its substantial collaborative networks, is not ranked among the top 5 nations based on document count. India holds that rank with 9 documents but doesn't make an appearance in Table 7 since it has identical link strength (4) as Canada but fewer citations (122 vs. 25).

Table 7 *- Top 5 countries based in Total Link Strength*

Country	cluster	Documents	Citations	Total link strength
United States	3	34	702	21
United Kingdom	2	10	177	13
France	5	4	107	6
Canada	5	4	122	4
Australia	2	4	73	4

Additionally, VOSViewer offers an insight into the mean publication years and citations for each country's papers. Figure 2 illustrates a network visualization of the average publication years for documents related to RPA. The magnitude of each item in the figure corresponds to the quantity of documents each country has published, reiterating the dominance of the top 5 countries concerning document production. The selected period for this analysis is from 2013 to 2023, where dark blue signifies countries with primarily pre-2014 publications and yellow represents countries with publications extending beyond 2022.

Figure 2 *- Average Publication Years*

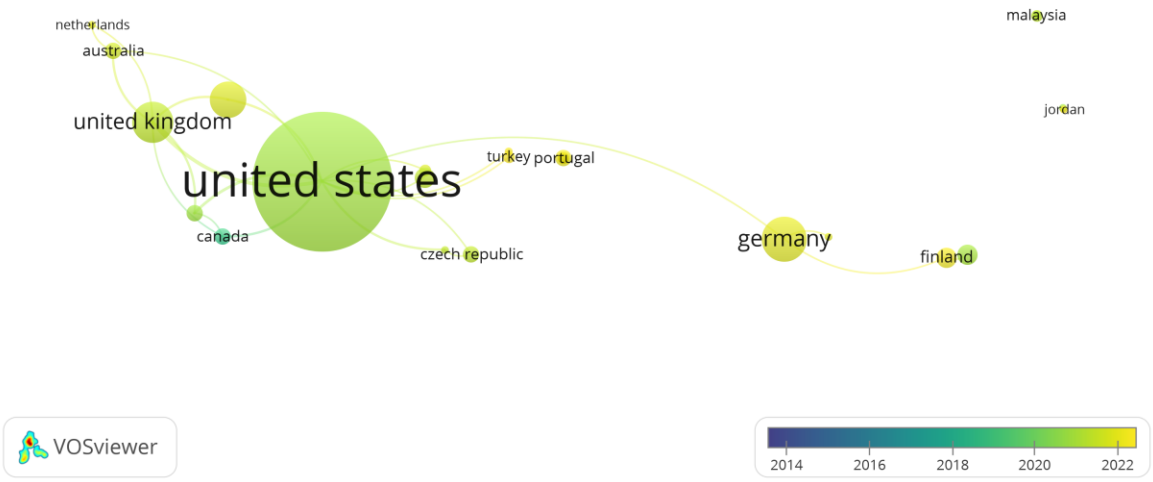


Figure 2 showcases the mean publication years. It's observed that the top 5 countries, including the USA and UK, have relatively recent average publication years. Nations with lower link strength and document counts, such as Germany and Turkey, also exhibit relatively recent publications. Table 8 provides a comprehensive breakdown of the top 5 countries with the most documents, including their average publication years.

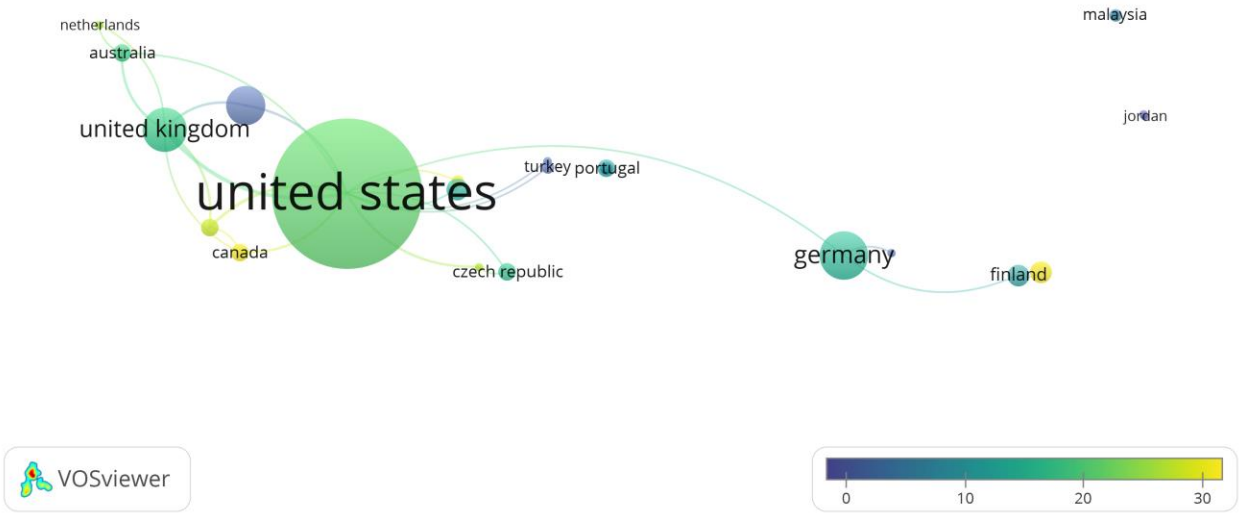
Table 8 *- Top 5 countries with most documents, and their average publication year*

Country	Cluster	Links	Documents	Citations	Total link strength	Avg. publication year
United States	3	12	34	702	21	2020
Germany	1	3	14	164	3	2021
United Kingdom	2	6	10	177	13	2021
India	10	2	9	25	4	2021
Finland	1	26	5	55	2	2021

The terms "Link" and "Total Link Strength" require some clarification. A link signifies a relationship between two elements, in this context, it indicates a collaboration between authors from two different nationalities. The USA has the most links, suggesting collaboration with authors

from 12 different nationalities. The "Total Link Strength" represents the frequency of a specific link, with the USA having a total link strength of 21, signifying the involvement of 21 authors from the 12 nationalities. The second figure created is predicated on "Documents" as the weight and "Average Citations" as the score type.

Figure 3 *- Average Citations*



The chosen range for the average citation analysis is between 0 and 20. Interestingly, nations with the most significant number of documents generally do not rank among the top 5 countries with the highest average citations. Table 9 details these findings.

Table 9 *- Top 5 countries with higher Average Citations*

Country	cluster	Links	Documents	Citations	Total link strength	Avg. Citations
Switzerland	1	1	5	248	1	49,60
Colombia	3	1	3	98	1	32,67
Canada	5	3	4	122	4	30,50
France	5	3	4	107	6	26,75
Bulgaria	4	2	2	51	3	25,50

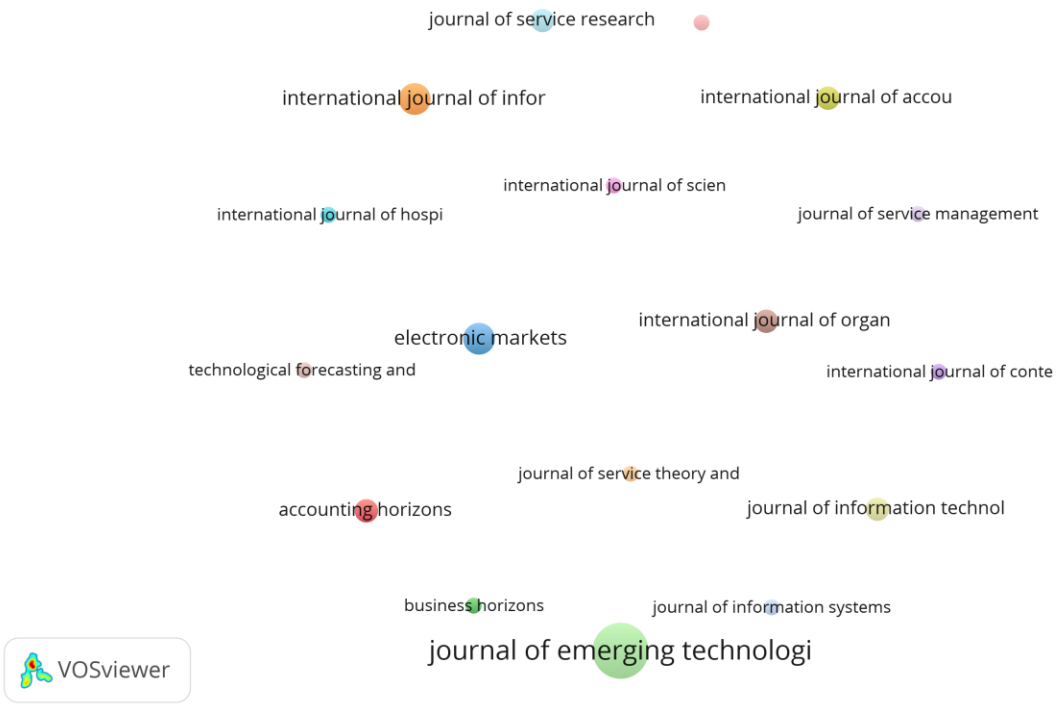
Switzerland, with the highest average citations, significantly exceeds Colombia, indicating that each document co-authored by Swiss authors receives an average of 49,60 citations. This noteworthy indicator could be a result of the lesser number of documents authored by Swiss authors.

This analysis illuminates the patterns of co-authorship and contributions from various nations in the field of robotic process automation (RPA). Notably, the USA, UK, France, Canada, and Australia emerges as the top five nations based on total link strength, signifying their substantial collaborative endeavours and citations. The analysis of average publication years underscores the dominance of the top five nations in terms of document output, with the USA and UK displaying more recent average publication years. Additionally, nations like Germany and Turkey, despite having lower link strength and document counts, exhibits relatively recent publications. The examination of average citations unveils interesting patterns, with nations possessing the highest document counts not necessarily ranking among the top five nations with the highest average citations. Switzerland stands out with the highest average citations, suggesting a substantial impact of each document co-authored by Swiss authors.

3.2 Citation – Sources

The "Citation – Sources" analysis uncovers the scholarly journals that have accumulated the greatest number of citations for their articles on Robotic Process Automation (RPA), and it showcases the interconnections among them. This dataset encompasses 87 sources, each of which satisfied the requirement of having at least 2 documents. This led to the detection of 17 unique clusters. Figure 4 shows the citation strength among the journals, highlighting an absence of interdependence among them.

***Figure 4** - Cited Journals*



Despite "International Journal of Accounting Information Systems" and "Accounting Horizons" being the most cited journals, they aren't interconnected, implying a dearth of cross-referencing among their articles on Robotic Process Automation. Interestingly, even though these two journals attain the highest citation figures, they don't hold the foremost position in the volume of RPA-related publications. This position is held by "Journal of Emerging Technologies in Accounting," as depicted in Table 10.

***Table 10** - Top 5 journals with most documents published.*

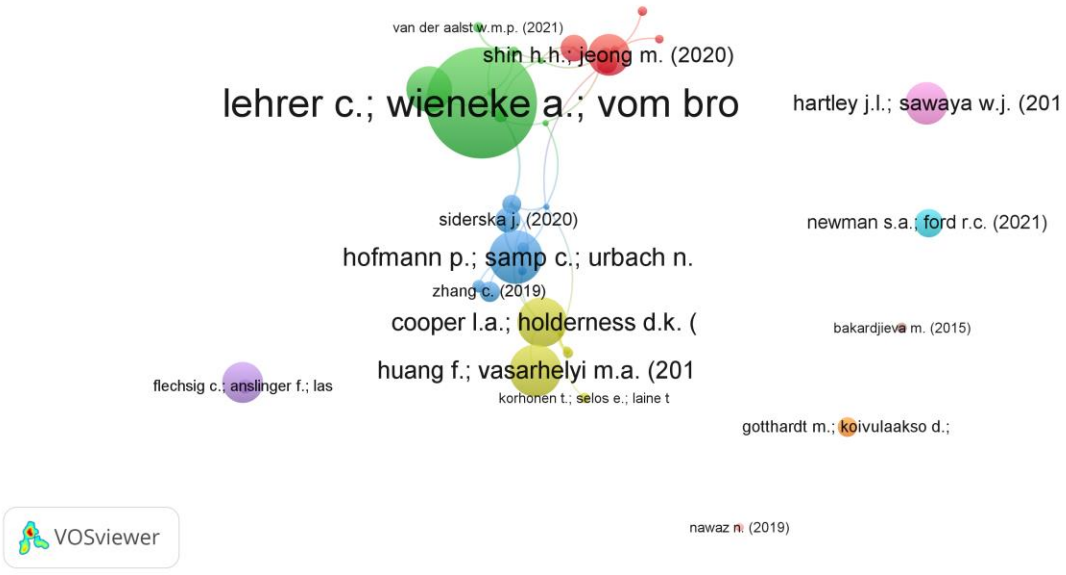
Source	Documents	Citations
Journal of emerging technologies in accounting	7	69
Electronic markets	4	117
International journal of information systems and project management	4	24
International journal of accounting information systems	3	163
International journal of organizational analysis	3	8

Considering the volume of citations and publications, it's evident that "Journal of Emerging Technologies in Accounting," "Electronic Markets," and "International Journal of Accounting Information Systems" stand out as the three notable academic journals contributing significantly to RPA, specifically within business applications. These journals have consistently exhibited their dynamic engagement and scholarly impact in furthering knowledge and comprehension in this field.

3.3 Bibliographic Coupling – Documents

This analysis “Bibliographic Coupling – Documents” scrutinizes the frequency of shared references between two articles, in addition to their individual citation counts (Small, 1973). Of the 118 considered documents, those with at least 10 citations were included, yielding a selection of 39 eligible articles. This scrutiny led to the identification of 12 unique clusters, as visualized in the subsequent graphic.

Figure 5 *- Authors with most cited documents*



From the graphic, it's clear that the contributions of (Lehrer et al., 2018) and (Hofmann et al., 2020) possess the highest citation prominence, indicating their considerable impact in the domain. Table 11 offers in-depth details about the top five most cited papers, comprising their titles and respective citation figures.

Table 11 *- Top 5 most cited documents*

Author	Document title	Citations
Lehrer C.; Wieneke A.; vom Brocke J.; Jung R.; Seidel S.	How Big Data Analytics Enables Service Innovation: Materiality, Affordance, and the Individualization of Service	194
Hofmann P.; Samp C.; Urbach N.	Robotic process automation	94
Huang F.; Vasarhelyi M.A.	Applying robotic process automation (RPA) in auditing: A framework	91
Cooper L.A.; Holderness D.K., Jr.; Sorensen T.L.; Wood D.A.	Robotic process automation in public accounting	87
Benbya H.; Nan N.; Tanriverdi H.; Yoo Y.	Complexity and information systems research in the emerging digital world	80

Using "Total Link Strength" as the metric for weightage, the ensuing graphic was constructed:

Figure 6 *- Authors with the strongest links*

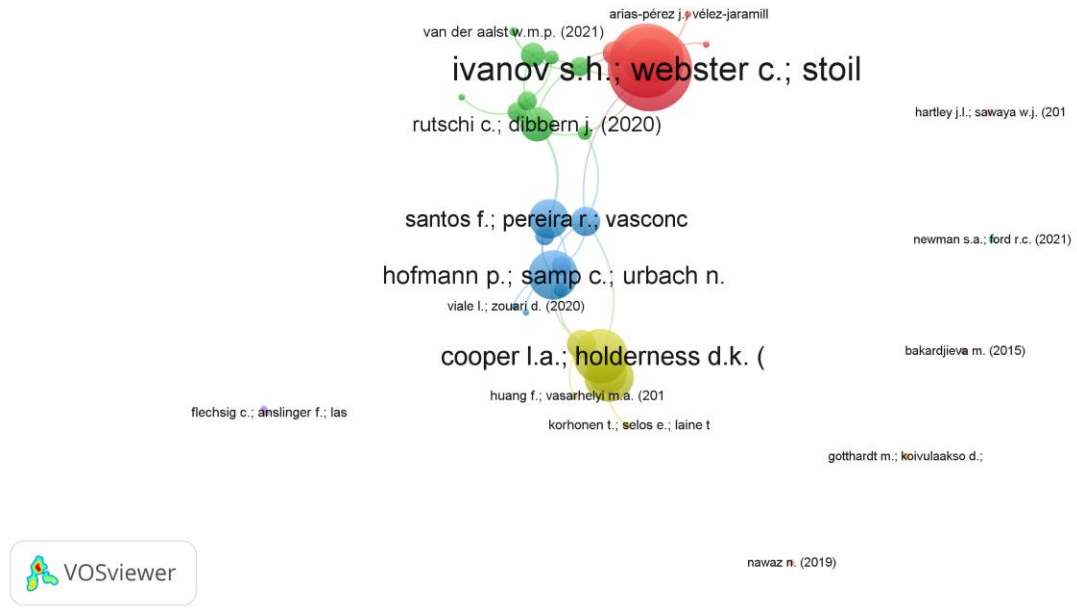


Table 12 presents an outline of authors and documents with the most potent links, denoting the authors whose contributions are frequently co-cited with other articles on Robotic Process Automation.

Table 12 - *Top 5 most co-cited documents*

Author	Document title	Links	Total Link Strength
Ivanov S.H.; Webster C.; Stoilova E.; Slobodskoy D.	Biosecurity, crisis management, automation technologies and economic performance of travel, tourism and hospitality companies – A conceptual framework	7	17
Hu Y.; Min H.; Su N.	How Sincere is an Apology? Recovery Satisfaction in A Robot Service Failure Context	7	15
Cooper L.A.; Holderness D.K., Jr.; Sorensen T.L.; Wood D.A.	Perceptions of Robotic Process Automation in Big 4 Public Accounting Firms: Do Firm Leaders and Lower-Level Employees Agree?	4	11
Hofmann P.; Samp C.; Urbach N.	Robotic process automation	8	10
Kokina J.; Gilleran R.; Blanchette S.; Stoddard D.	Accountant as digital innovator: Roles and competencies in the age of automation	3	10

The dataset derived from VOSViewer and the subsequent examinations, specifically "Bibliographic Coupling – Documents" and "Total Link Strength," offers different perspectives into the research panorama of robotic process automation (RPA) in the sphere of business applications. The analysis of citation patterns exposes noteworthy correlations and influential contributions within the discipline. The works of Lehrer C. and Hofmann P. surfaces as highly cited articles, emphasizing their considerable impact and influence. The document titled "How Big Data Analytics Enables Service Innovation: Materiality, Affordance, and the Individualization of Service" by Lehrer et al. (2018) received the highest number of citations. Moreover, the evaluation of strong correlations between co-cited documents underscores the influential roles performed by authors like Ivanov et al., Hu et al., and Cooper L.A. et al. in the dialogue surrounding RPA. These discoveries are useful to delineate a comprehension of the main contributors and interconnectivity within the RPA realm, illuminating the noteworthy works and influential authors shaping the research landscape.

3.4 Co-occurrence – All keyword

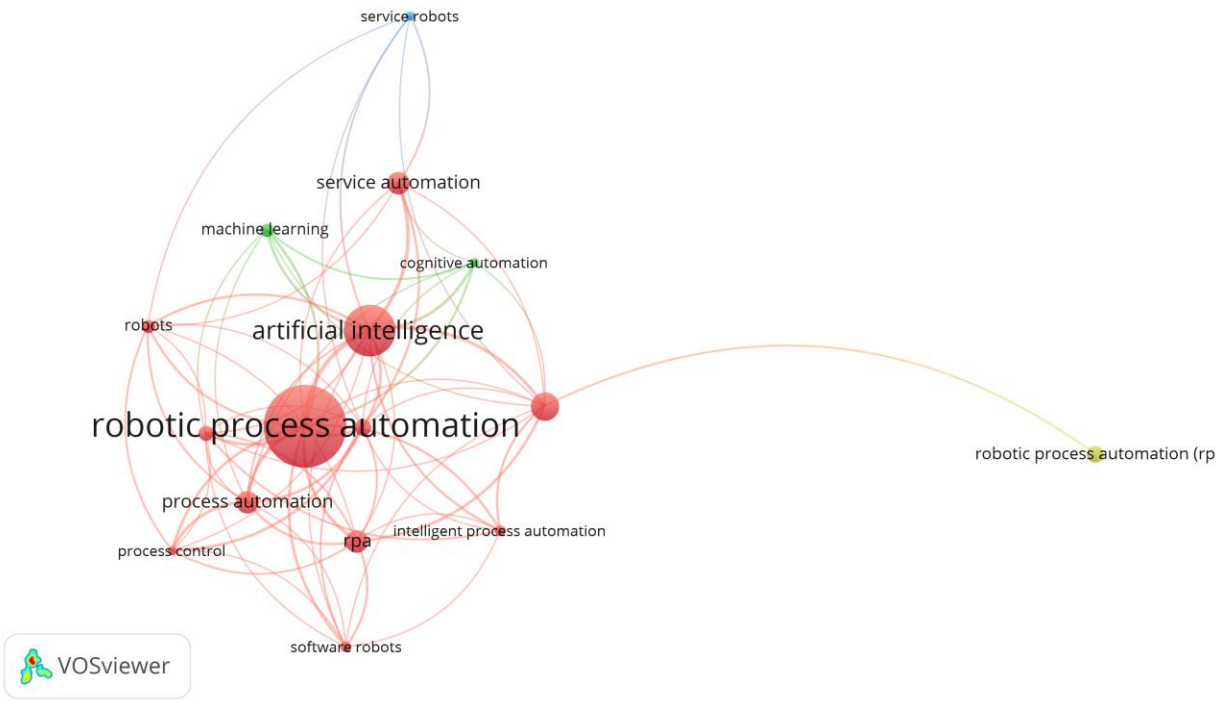
The "Co-occurrence - All Keywords" analysis was conducted using a minimum occurrence threshold of 5 for each keyword to be included in the network. From the initial pool of 526 keywords, 16 items met the eligibility criteria. This analysis holds particular significance for this dissertation as it allows for the identification of the most frequent keywords in articles related to Robotic Process Automation (RPA). The resulting dataset yielded 2 distinct clusters, categorizing the 16 keywords based on their co-occurrence frequency within the same articles. Table 13 presents these clusters, their constituent items, and corresponding descriptions.

Table 13 - *Co-occurrences' clusters*

Cluster 1 (Process Automation and Robotics)	**Cluster 2 (Intelligent Automation and Artificial Intelligence)**
digital transformation	artificial intelligence
process automation	automation
process control	cognitive automation
robotic process automation	intelligent process auto
robotics	machine learning
robots	robotic process automation
rpa	service automation
software robots	service robots

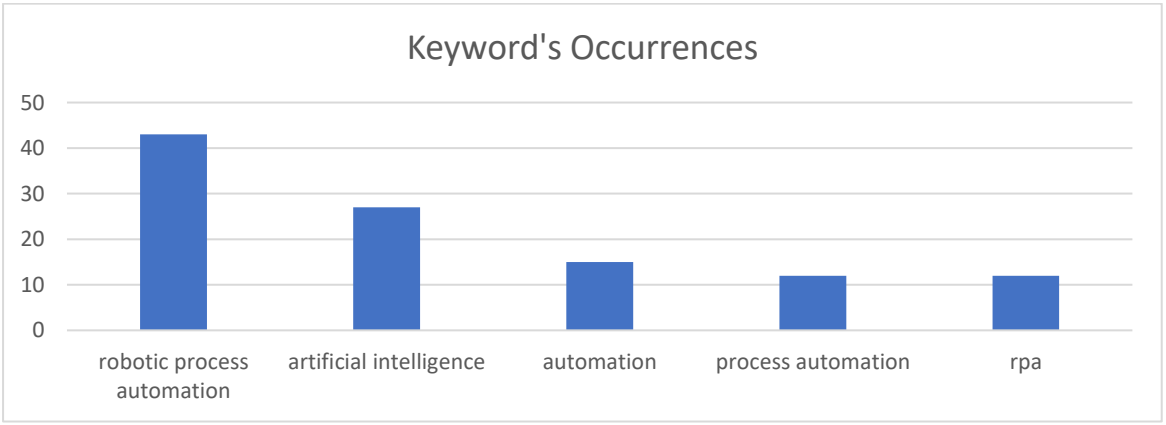
Figure 7 showcases the weight of each keyword, indicating the number of occurrences, as well as their proximity to each other. The colours employed in the figure represent the respective clusters to which the keywords belong.

***Figure 7** - Co-occurrences between keywords*



Unsurprisingly, given the focus of this research on RPA, "Robotic Process Automation" emerges as the keyword with the highest weight, occurring 43 times within the dataset. The top 5 keywords in terms of occurrence are presented in Figure 8.

***Figure 8** - Top 5 Keywords in terms of occurrences*



Another noteworthy indicator is the average publication year of the documents containing these keywords. This provides insights into the keywords that have been extensively discussed in recent years, considering both pre-COVID and post-COVID timelines. By assigning weight based on occurrences and using "Average Publication Year" as the scoring metric within the range of 2019 to 2022, Figure 9 illustrates the co-occurrences of keywords along with their average publication years.

Figure 9 *- Co-occurrences, with average publication years*

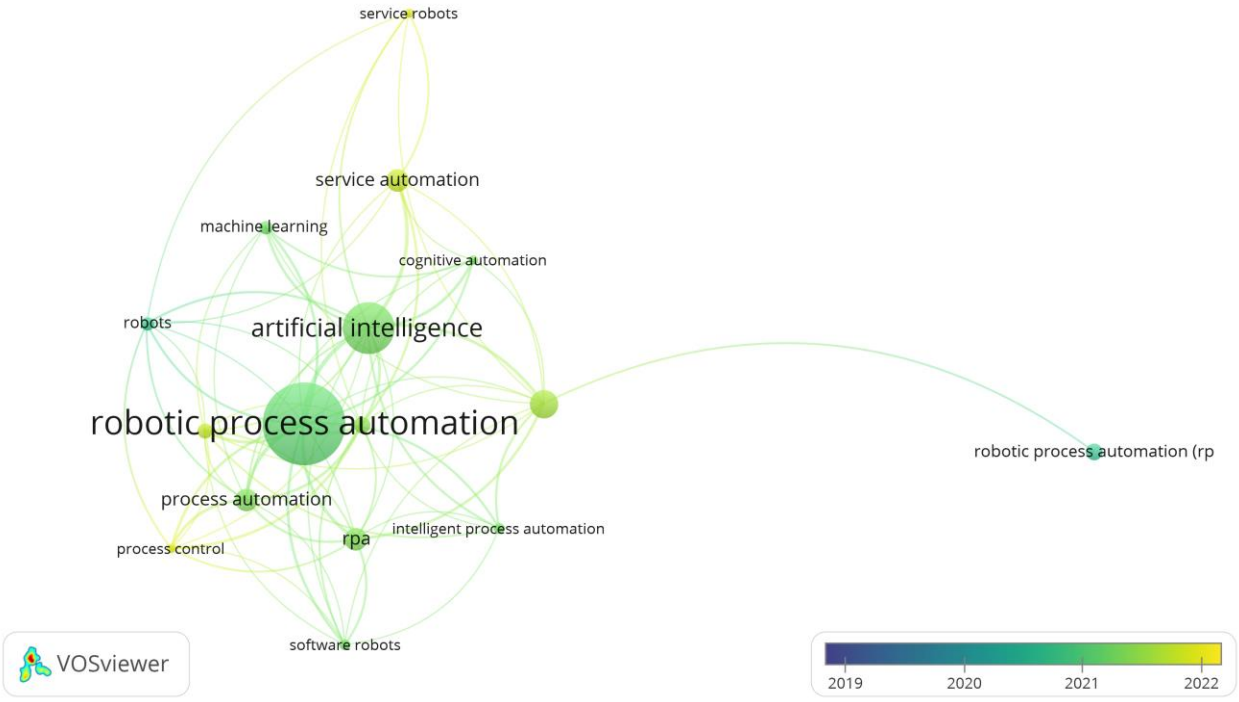


Table 14 presents the top 5 most recent keywords based on their average publication year.

Table 14 *- Top 5 most recent keywords, in average publication year*

Keyword	Average Publication Year
process control	2022
service robots	2022
service automation	2022
digital transformation	2022
automation	2021

It is worth noting that all keywords eligible for the network analysis are situated primarily after 2020, following the emergence of the COVID-19 pandemic. Considering that the collected articles span the period from 2013 to 2022, the fact that the least recent keyword in terms of average publication year is from 2013 demonstrates the significant growth and relevance of the RPA concept in recent years. This observation is consistent with the trends depicted in Figure 1.

Considering the collected articles, the Co-occurrence analysis sheds light on the prevalent keywords, their associations, and the evolving landscape of RPA research. The clustering of keywords, their frequencies, and average publication years provides a different point of view on the state-of-art, contributing to a deeper understanding of the topic within the context of this dissertation.

3.5 Analysing the main articles with the highest number of citations

A comparative review of the ten most frequently cited articles on "Robotic Process Automation" (RPA) from Scopus unveils several recurring subjects, similarities, and differences. A prominent trend seen throughout these papers is the universal recognition of RPA's transformative capacity and its ability to significantly improve accuracy, efficiency, and cost-effectiveness across a variety of business areas. The importance of RPA in automating repetitive, monotonous tasks, thus releasing human resources for more strategic, high-value activities is often highlighted in these articles.

The potential of Robotic Process Automation (RPA) to simplify and automate routine, repetitive tasks with low judgment requirements, allowing professionals to focus on more complex and value-added activities, is a common theme across these articles. In a framework proposed for the use of RPA in auditing, Huang & Vasarhelyi (2019) underscore this point by illuminating RPA's efficiency and effectiveness in automating standard audit processes.

In their research, the authors list multiple advantages of implementing RPA in auditing practices. Firstly, RPA frees auditors from routine and repetitive tasks, enabling them to dedicate their expertise and time to more critical elements of the audit process that require professional judgment. With the automation of routine tasks, auditors can invest their energy in analysing complex data patterns, assessing risks, and making informed decisions.

Moreover, Huang and Vasarhelyi highlight RPA's scalability, which allows auditors to broaden the scope of audit procedures. In the past, the boundaries of human processing power could

limit the amount of evidence gathered and the breadth of audits. With RPA, however, task automation allows for greater coverage and depth, potentially resulting in more thorough audit procedures and improved audit quality.

Another key advantage emphasized by Huang and Vasarhelyi is the minimization of human errors. RPA systems display high accuracy levels, with an accuracy rate of 99.9% compared to humans' 90% accuracy rate. By decreasing the potential for human errors, RPA improves audit reliability and precision, enhancing overall audit results.

The work of Huang and Vasarhelyi epitomizes RPA's potential to revolutionize the auditing profession by reducing the load of routine tasks, expanding audit procedures' scope, and improving accuracy. These findings align with the general narrative in the other articles such as the one from Santos et al. (2020), which also highlight the potential benefits of RPA in freeing professionals' time and allowing them to concentrate on activities that require human judgment and expertise. This consistent theme underlines RPA's transformative power across various domains and its potential to redefine the future of work.

The notion of digital transformation appears as a prominent theme across the analysed articles, emphasizing the profound impact of RPA on organizational processes and job roles. Cooper et al. (2022) explore the adoption of RPA in public accounting, stressing how RPA is altering the nature of jobs instead of leading to job reduction. They argue that RPA doesn't eliminate positions but transforms tasks and responsibilities of professionals in the accounting domain. This paradigm shift requires acquiring new skills and embracing organizational change to effectively incorporate RPA into accounting processes.

Cooper et al.'s findings align with the broader concept of digital transformation, which involves reimagining and restructuring traditional processes through digital technology infusion. The integration of RPA demands professionals adapt to a new working environment and develop competencies to work alongside automated systems. As RPA automates repetitive and rule-based tasks, accountants are released from repetitive activities, enabling them to concentrate on their roles' more strategic and analytical aspects. This shift towards higher-value work not only enhances job satisfaction but also allows professionals to contribute more significantly to organizational success.

Moreover, Hartley & Sawaya (2019) underline the need to update foundational information systems and develop a digital roadmap as essential steps to embracing RPA within the broader

context of supply chain processes. They insist that digital transformation extends beyond just RPA adoption; it involves a complete re-evaluation and enhancement of information systems to facilitate seamless integration and utilization of RPA technologies. By updating foundational systems like Enterprise Resource Planning (ERP) and e-procurement, organizations can guarantee the availability of accurate, real-time data, which is a vital input for RPA-enabled processes.

Additionally, Hartley and Sawaya (2019) underscore the importance of crafting a digital roadmap aligning business and IT strategies. This roadmap serves as a strategic blueprint guiding organizations in effectively leveraging RPA and other digital technologies. It outlines the steps and milestones necessary to navigate the digital transformation journey, allowing organizations to optimize RPA implementation within their supply chain processes.

Together, the insights from Cooper et al. (2022) and Hartley and Sawaya (2019) underline RPA's transformative nature and its role in catalysing digital transformation. RPA acts as a catalyst for organizational change, necessitating the development of new skills, updating foundational systems, and aligning business and IT strategies strategically. Embracing RPA as part of the broader digital transformation journey empowers organizations to unlock the full potential of automation technologies, driving efficiency, agility, and innovation across their processes.

The perspectives and perceptions of customers regarding Robotic Process Automation (RPA) are vital considerations for organizations implementing automation technologies. Several articles highlight this aspect, offering insights into factors influencing customers' attitudes and expectations.

Shin & Jeong (2020) explore the influence of factors such as form and interaction on the reception of robotic concierges by hotel guests. They discovered that guests' opinions significantly swayed by the visual characteristics of these robots. Interestingly, guests held a higher preference for caricature-like robotic concierges over those resembling humans or animals. This suggests that customers might feel unsettled or disturbed by humanoid appearances, in line with the uncanny valley theory. As such, it is vital for robot designs to align with customers' tastes and expectations to foster positive acceptance of RPA in service provision scenarios.

In a different vein, Lehrer et al. (2018) delve into the potential of Big Data Analytics (BDA) in offering customized services tailored to individual needs, thus shaping customer experiences. BDA can generate valuable insights into customer behaviour, empowering organizations to proactively cater to their customers' needs. With BDA, organizations can harness extensive data to

comprehend customers' desires and requirements, allowing them to offer personalized services in real-time, exceeding individual customer expectations. Furthermore, BDA enhances the speed of service provision, enabling swift responses to customer requests and boosting overall service efficiency.

These studies underline the importance of catering to customer perspectives while implementing RPA and innovating services. Robots should be designed to match customer expectations, and BDA should be employed to gain insights into customer behaviour to enhance customer experiences. Prioritizing customer-centric approaches and leveraging technologies like BDA and RPA can lead organizations to secure a competitive edge and deliver a unique, individualized services in line with evolving customer expectations.

By intertwining customer-oriented strategies and technologies such as BDA with RPA, organizations can build robust relationships with customers, create positive impressions of automation, and fuel service innovation. Such initiatives enable tailored experiences, heightened service efficiency, and improved customer satisfaction and loyalty. Realizing the integral role customers play in the successful adoption of RPA, organizations can use these insights to improve their strategies, design customer-focused solutions, and deliver outstanding service experiences in the automation era.

An overarching theme across the reviewed articles is the profound impact of Robotic Process Automation (RPA) on leadership styles and organizational practices, indicating the shifting dynamics of work and the need for leaders to evolve their methods to keep pace with technological advancements.

Newman & Ford (2021) delve into the complexities of managing virtual teams amid the COVID-19 pandemic. They stress the role of effective leadership in remote team management and suggest steps to navigate the digital work landscape. Their research underscores the necessity for leaders to modify their practices and devise a digital roadmap to maintain team culture and cohesion. Effective communication, trust-building, and the establishment of clear operational goals can facilitate an environment conducive to collaboration and productivity in virtual teams. Moreover, they emphasize the significance of mental health considerations in remote work and the need to prioritize employee wellbeing in a virtual setting.

On a similar note, Heller et al. (2021) present the Technology-Enabled Engagement Process framework (TEEP) in the context of augmented reality (AR), emphasizing AR's potential to

transform service automation and its effect on customer decision-making and behaviour. The authors postulate that AR can drastically alter customer experiences by providing customized and interactive information in real-time. They also stress the need for future research to consider customer diversity and cultural viewpoints when exploring the deployment of service automation technologies. Understanding customer preferences and tailoring automation technologies to suit varying cultural contexts help organizations to boost the effectiveness and acceptance of AR-based services.

The articles highlight the crucial role of leadership in managing the challenges posed by RPA and service automation. Leaders need to evolve their approaches, formulate digital roadmaps, and prioritize effective communication and team cohesion in the context of remote work. The introduction of RPA and AR technologies necessitates leadership that fosters collaboration, trust, and employee well-being in virtual and augmented settings. Embracing these leadership practices can help organizations successfully utilize RPA and service automation to enhance productivity, stimulate innovation, and boost customer satisfaction in the digital age.

Diverse methodological approaches are reflected across the reviewed articles, indicating the multifaceted nature of research into Robotic Process Automation (RPA) and its implications. The authors deploy various methods to scrutinize different facets of RPA and its impacts on distinct fields.

Kokina & Blanchette (2019) utilize a mixed-methods approach, fusing interviews with a pilot project to explore early indications of digital labour in accounting and the potential for innovation through RPA. Their interviews with RPA users offer insights into task suitability, implementation challenges, and performance results. Their pilot project serves as a practical demonstration of RPA's effectiveness in automating standard audit procedures and with their research Kokina and Blanchette (2019) offer insights into RPA's benefits, such as improved process documentation, error reduction, and report quality, by employing qualitative interviews and a practical application,

In contrast, Hofmann et al. (2020) adopt a conceptual approach, offering a framework to understand the intricacies of information systems research in the burgeoning digital world. They delve into various themes, such as rapidly changing system design requirements, steering complex sociotechnical systems with digital technologies, and the use of algorithms to manage complexity. Rather than relying on empirical data, they provide a theoretical foundation for understanding the

challenges and opportunities presented by digital complexity. Their conceptual framework serves as a beacon for future research and highlights the complex relationship between complexity and information systems in the digital age.

These methodological strategies identify the spectrum of tactics researchers employ in studying RPA and its implications. The use of interviews and pilot projects yields empirical insights into the application and effectiveness of RPA in specific domains, while conceptual frameworks offer a broader understanding of the complexities and potential research paths associated with RPA. With a diverse range of methodologies, researchers contribute to a comprehensive understanding of RPA's benefits, challenges, and transformative potential across various contexts. This methodological diversity fortifies the body of knowledge surrounding RPA and enables researchers to investigate its implications from multiple perspectives.

Benbya et al. (2020) delve into the complexities of the digital era and propose five research themes that elucidate this relationship.

First, they highlight the need to design information systems capable of adapting to unforeseen or rapidly evolving requirements. They stress the importance of creating agile systems that can adapt alongside shifting environments and organizational objectives. This aligns with the concept of RPA's potential to streamline and automate processes, allowing organizations to respond more efficiently to changing demands (Huang & Vasarhelyi, 2019).

Second, they examine how digital technologies can guide complex sociotechnical systems through phase transitions. This resonates with the discussions in several articles about the transformative effects of RPA on business models and organizational structures (Cooper et al., 2022; Kokina & Blanchette, 2019).

Additionally, the authors investigate the impact of complex institutional structures on the evolution of enterprise information systems. This aligns with the emphasis in some articles on the need for organizations to adapt their methodologies and develop new skills in response to RPA adoption (Cooper et al., 2022; Shin & Jeong, 2020).

Furthermore, Benbya et al. (2020) address the use of algorithms in managing complexity within sociotechnical systems, emphasizing the potential of big data, machine learning, and AI algorithms. This aligns with discussions on the integration of AI and cognitive technologies with RPA to handle complex decisions (Huang & Vasarhelyi, 2019).

Finally, the authors discuss the potential of digital capabilities to create competitive advantages in complex environments. This is consistent with discussions on the benefits of RPA in improving process performance, efficiency, scalability, and auditability, leading to competitive advantages (Hofmann et al., 2020; Huang & Vasarhelyi, 2019).

The comparative analysis illuminates a dynamic and evolving landscape in which RPA is significantly reshaping industries and practices. The analysed articles demonstrate RPA's potential advantages in enhancing process efficiency, simplifying operations, and driving organizational performance. From auditing to supply chain management, RPA demonstrates its capability to automate routine tasks, reduce errors, and enhance output quality.

Moreover, the articles underline the strategic considerations necessary for successful RPA implementation. Aligning RPA adoption with organizational strategies, such as integrating RPA into digital transformation efforts, is vital. Organizations must develop a clear vision, digital roadmaps, and ensure foundational information systems are updated to support RPA implementation. Additionally, the articles underscore the importance of skill development and organizational change, as RPA demands new capabilities and reconfiguration of work processes.

4. Discussion and Findings

In this chapter, we will delve into the discussion and findings derived from the analysis of the literature on Robotic Process Automation (RPA). The aim is to provide a comprehensive understanding of the research landscape surrounding RPA and to highlight the contributions made to theory and practice.

4.1 Organization of Knowledge

A thorough examination of the research environment unveils several themes that lay the groundwork for RPA studies, creating a comprehensive schema useful to interpret the myriad facets of RPA and its influence across various fields.

A prominent subject arising from the scholarly work is the potential of RPA to instigate transformative changes. Scholars from an array of disciplines acknowledge the substantial effects of RPA on improving accuracy, cost-efficiency, and productivity in several business sectors. The capacity of RPA to mechanize routine and monotonous tasks facilitates operational streamlining

for organizations, minimizes errors, and allows for the reassignment of human resources to tasks of strategic significance and higher value. Conversations about how this transformative power can redefine the work landscape and foster innovation within organizations have been spurred by this potential.

Further, an in-depth exploration of RPA's practical application across different industries constitutes another critical topic. The implementation of RPA in realms like auditing, accounting, supply chain management, and customer service has been the subject of many scholarly investigations. These studies shed light on the distinct advantages and hurdles associated with RPA deployment in various contexts, offering insights into the domain-specific repercussions of RPA uptake. Comprehending how RPA is used in a wide range of industries is vital for organizations intending to harness its prospective benefits effectively.

Also, the scholarly literature delves into the ramifications of RPA on leadership styles and organizational practices. The challenges and opportunities brought about by RPA, especially concerning managing remote teams, have been explored by researchers. Effective leadership strategies, including clear communication, fostering trust, and setting unequivocal operational targets, have been identified as key elements for navigating the virtual work setting and maintaining team unity and culture. The uptake of RPA necessitates leaders to adjust their strategies and design digital blueprints to ensure RPA technologies are smoothly incorporated into organizational workflows.

Moreover, considerable research has been dedicated to understanding customer perspectives towards RPA adoption. The way customers perceive and engage with RPA-facilitated services, including factors like the visual appeal of robots, interactivity, and the effect of RPA on customer experiences, have been scrutinized by researchers. Recognizing customer preferences and meeting their expectations are of paramount importance for companies implementing RPA, to guarantee customer acceptance and foster positive attitudes towards automation technologies.

These themes form a structured schema useful to understand the multiple dimensions of RPA and its influence across diverse fields. Scrutinizing the transformative potential of RPA, its application across various industries, its implications for leadership and organizational practices, and customer perspectives, allows researchers to gain a holistic comprehension of RPA's multifaceted nature. Naturally, this structured body of knowledge aids further inquiry, analysis,

and progression of RPA studies, thereby fostering a continued development of theoretical and practical aspects in this field.

4.2 Main Issues, Debates, and Lines of Research

Several main issues, debates, and lines of research are prevalent in the literature on Robotic Process Automation (RPA), contributing to a vibrant and evolving research landscape. The discussions shed light on the transformative potential of RPA, its impact on job roles, and the challenges and opportunities associated with leading virtual teams in the context of RPA adoption.

One recurring theme in the literature is the transformative potential of RPA in enhancing efficiency, precision, and cost-effectiveness across different business domains. Researchers widely acknowledge the ability of RPA to automate routine and repetitive tasks, freeing up human resources for more strategic and value-added work. This transformative potential has significant implications for organizational processes and has led to discussions on how RPA can revolutionize industries, reshape job roles, and drive innovation.

An ongoing debate in literature revolves around the impact of RPA on job roles. While concerns about job displacement have been raised, evidence suggests that RPA primarily transforms tasks and responsibilities rather than leading to widespread job reduction. Studies highlight how RPA enables professionals to shift their focus from mundane and repetitive tasks to more complex and analytical activities that require human judgment and expertise. This debate emphasizes the need to redefine job roles and develop new skills in response to RPA adoption, rather than viewing RPA as a direct threat to employment.

The literature also delves into the challenges of leading virtual teams in the context of RPA adoption. With the increasing adoption of RPA and the rise of remote work, effective leadership and team cohesion become critical factors in ensuring the successful integration of RPA technologies. Managing virtual teams requires leaders to adapt their practices, foster communication and collaboration, and build trust among team members. The literature highlights the importance of maintaining team culture, setting clear operational goals, and addressing the unique challenges posed by remote work environments.

The issues, debates, and lines of research identified in the dissertation facilitate the acknowledge of a deeper understanding of the complexities and implications of RPA adoption as

they reflect the dynamic nature of the field and can provide different point of views for researchers and practitioners. Researchers bring several different perspectives to the RPA domain by exploring the transformative potential of RPA, its impact on job roles, and the challenges of leading virtual teams. Their work adds depth to ongoing discussions, pushing the advancement of both theory and practice. Furthermore, their research sparks inspiration for future inquiries, provokes critical questions, and drives the exploration of new solutions and approaches. This ultimately aids in leveraging RPA for organizational success.

4.3 Main Authors, Journals, and Geographies

The analysis of authors, journals, and geographies in Robotic Process Automation (RPA) research reveals a diverse and global landscape, with contributions from researchers worldwide. This broad participation reflects the growing interest and importance of RPA and highlights the collaborative efforts of researchers from different backgrounds.

Notable authors have emerged as key contributors to the field of RPA research. Among them, Lehrer C., Hofmann P., Huang F., Vasarhelyi M.A., Cooper L.A., and Holderness D.K. have made significant contributions through their extensive research and publications on various aspects of RPA, including its applications, implications, and transformative potential.

In terms of journals, several publications have served as platforms for RPA research dissemination. The International Journal of Accounting Information Systems, Accounting Horizons, and the Journal of Emerging Technologies in Accounting are recognized as leading outlets for scholarly work in the RPA domain. These journals have created a platform for researchers to publish their findings, exchange ideas, and engage in discussions surrounding RPA. The high citation counts, and influence of these journals underscore their significance in shaping the research landscape and disseminating cutting-edge contributions.

Geographically, RPA research has seen publications from various regions around the world. The United States, the United Kingdom, and Germany have emerged as major contributors to the field, with researchers from these countries actively engaged in RPA research. The above geographies have demonstrated a strong presence in terms of the number of publications, collaborations, and influential contributions, even if researchers from other countries have also made notable contributions to the field.

The diverse landscape of authors, journals, and global locations involved in RPA research underscores the international interest in and commitment to this field. This variety not only enriches our understanding of RPA, but also highlights the value of their contributions, the impact of leading journals, and the significance of global research distribution.

4.4 Main Publications, Citations, and Keywords

The analysis of the most cited publications in Robotic Process Automation (RPA) offers perspectives into the seminal works that have shaped the field and influenced the direction of research and practice, and these publications serve as pillars of knowledge, providing a foundation for understanding the potential benefits and strategic considerations associated with RPA implementation.

The publications consistently highlight the transformative potential of RPA in enhancing process efficiency, streamlining operations, and driving organizational performance. They emphasize the advantages of automating routine and repetitive tasks, freeing up human resources to focus on more complex and value-added activities. It his highlighted how by automating these tasks, RPA contributes to increased accuracy, scalability, and auditability, resulting in improved overall process quality and effectiveness.

Strategic considerations emerge as a key theme across these publications as they emphasize the need for organizations to align RPA initiatives with broader digital transformation efforts. Successful implementation of RPA requires strategic vision, clear roadmaps, and the updating of foundational information systems to support the integration and utilization of RPA technologies. The analysed studies highlight the importance of organizational change management, skill development, and the cultivation of a culture that embraces automation and innovation.

Keywords associated with RPA, such as process automation, artificial intelligence, digital transformation, and service innovation, further reinforce the prevalent themes and concepts within the field. These keywords reflect the interrelation of RPA with other emerging technologies, the focus on organizational transformation, and the potential for innovation in service delivery.

The analysis of the most cited publications in RPA underscores the significant impact of these works on the field. These publications supply a contribution useful to understand the potential benefits, challenges, and strategic considerations associated with RPA implementation and they serve as a foundation for theory and practice, guiding researchers and practitioners in exploring the

transformative potential of RPA, driving innovation, and maximizing the value of automation technologies in various domains and industries.

4.5 Interpretation of Findings and contributions

The findings derived from the analysis of the literature provide compelling evidence that confirms the transformative potential of Robotic Process Automation (RPA) across various domains. The literature consistently highlights the numerous benefits of RPA, including enhanced efficiency, streamlined operations, and improved organizational performance. This shift in focus not only contributes to increased job satisfaction but also allows organizations to leverage the full potential of their human resources in driving innovation and value creation.

To achieve successful RPA implementation, the findings emphasize the importance of strategic alignment with organizational methodologies, particularly digital transformation efforts. RPA should be integrated into broader digital transformation initiatives, ensuring that it aligns with the organization's overall vision, goals, and strategies. This strategic alignment facilitates the effective utilization of RPA technologies and maximizes their impact on organizational processes and outcomes.

However, the findings also highlight that successful RPA implementation goes beyond technological considerations. It necessitates the development of new skills and capabilities among employees to effectively work alongside automated systems. Organizations need to invest in training programs and provide opportunities for upskilling and reskilling to ensure that employees are equipped with the necessary competencies to thrive in an automated work environment. This proactive approach to skill development supports the successful integration of RPA and helps employees adapt to the changing nature of work.

Effective leadership is crucial in navigating the challenges posed by RPA and remote work environments. The findings underscore the importance of leaders in effectively managing virtual teams and fostering collaboration and productivity in remote work settings. Leaders must adapt their practices and develop a digital roadmap that sustains team culture and cohesion in virtual work environments. Furthermore, the findings emphasize the significance of attending to the mental health aspects of remote work and addressing employee well-being, as these factors contribute to the overall success of RPA implementation and organizational performance.

The findings also underscore the importance of understanding and addressing customer perspectives in RPA adoption. Recognizing that customers are key stakeholders in the adoption and success of RPA, organizations must consider their expectations, preferences, and experiences. Designing robots and software robots with appropriate appearances and functionalities and leveraging technologies like Big Data Analytics (BDA) to gain insights into customer behavior contribute to delivering enhanced customer experiences. The alignment between RPA initiatives and customer-centric strategies can allow organizations to foster positive perceptions of automation and drive service innovation, leading to improved customer satisfaction and loyalty.

The integration of RPA with digital transformation efforts highlights the need for organizations to adapt their methodologies and develop new capabilities to leverage the benefits of automation technologies. The findings emphasize the importance of strategic alignment between RPA adoption and digital transformation efforts. Organizations are encouraged to develop clear visions and digital roadmaps that align with their overall business strategies. The research highlights the need for organizations to update their foundational information systems, such as Enterprise Resource Planning (ERP) and e-procurement, to support the integration and utilization of RPA technologies effectively. Moreover, the research underlines the significance of skill development and organizational change in successfully implementing RPA. It emphasizes the need for professionals to acquire new skill sets and adapt to the changing work environment. Organizations can make informed decisions and develop practical strategies for successful implementation by acknowledging the different perspectives into the benefits and challenges of RPA adoption identified in this research. Additionally, the research highlights the importance of understanding customer perspectives in the design and implementation of RPA. By considering customer expectations and preferences, organizations can personalize and individualize their services, leading to enhanced customer experiences and the practical recommendations derived from the research findings guide practitioners in leveraging RPA to drive efficiency, agility, and innovation in their processes.

5. Conclusion

This dissertation aimed to explore the field of Robotic Process Automation (RPA) and its organizational structure, main issues, key contributors, and emerging research trends. The first research question examined the organization of knowledge in the field of RPA through bibliometric

analysis and visualization techniques. This analysis identified clusters of co-authorship among countries, citation networks among journals, and co-occurrence patterns among keywords, revealing collaborative efforts and prevalent research themes. In terms of geographies, the United States, United Kingdom, France, Canada, and Australia emerged as the top countries for research output and collaboration, while the International Journal of Accounting Information Systems and Accounting Horizons stood out as highly cited journals. Key concepts such as process automation, robotics, and RPA frequently co-occurred, highlighting their centrality in the field.

Turning to the second research question, the analysis identified the main issues, debates, and lines of research in the field of RPA. A consistent emphasis was found on the transformative potential of RPA in enhancing efficiency, precision, and cost-effectiveness across various domains. The automation of routine and repetitive tasks emerged as a recurring theme, enabling the allocation of human resources to more strategic and value-added work. The importance of RPA in auditing practices, supply chain management, and customer experiences was highlighted, with digital transformation serving as a prominent theme and by this underscoring the need for organizations to update foundational information systems and develop digital roadmaps for effective RPA integration.

Moving to the third research question, an investigation into the main authors, journals, and geographies in RPA research revealed the significant contributions of authors such as Lehrer C., Hofmann P., and Huang F. The United States, United Kingdom, France, Canada, and Australia emerged as leading countries in terms of research output and collaboration. These findings demonstrated the global reach and collaborative nature of RPA research, facilitating diverse perspectives and expertise in the field.

Finally, the fourth research question explored the main publications, citations, and keywords related to RPA. By conducting bibliographic coupling analysis, the most cited articles were identified and analysed, showcasing their impact and influence. These articles emphasized the benefits of RPA in automating routine tasks, enhancing audit quality, streamlining supply chain processes, and improving customer experiences. Prevalent keywords such as process automation, robotics, digital transformation, and artificial intelligence reflected the key concepts and themes in RPA research.

The theoretical contributions of this study lie in providing a comprehensive understanding of the organizational structure and research landscape of RPA. The analysis of co-authorship

patterns, citation networks, and keyword co-occurrence identified key contributors, prevalent themes, and emerging research trends, guiding researchers in identifying research gaps, exploring new avenues of inquiry, and fostering interdisciplinary collaborations.

From a practical perspective, the findings offer insights for organizations implementing RPA. The emphasis on digital transformation, updating information systems, and developing digital roadmaps provides practical guidance for successful RPA integration. Understanding customer perspectives and the importance of delivering personalized experiences can inform strategies to leverage RPA for enhanced customer satisfaction and loyalty. The identification of influential journals and highly cited articles guides practitioners and researchers in accessing valuable resources and staying up to date with the latest developments in the field.

Future lines of research can explore the ethical implications of RPA, including job displacement, privacy concerns, and algorithmic bias, to gain a comprehensive understanding of the societal impact of automation technologies. Furthermore, studying RPA in specific industries and sectors, such as healthcare, finance, and manufacturing, can provide insights into domain-specific challenges and opportunities. Additionally, exploring the integration of RPA with emerging technologies like blockchain and Internet of Things (IoT) can uncover novel applications and synergistic effects.

6. Limitations

This chapter aims to provide a comprehensive discussion of the limitations encountered during the research process, focusing on various aspects related to the problem statement, research objectives, sample size, data availability and reliability, as well as the lack of previous research studies on the main topic.

One of the limitations of this study is related to the problem statement and research objectives and, since the problem statement was formulated based on a specific context and set of assumptions, the findings may be context-specific and may not be easily generalizable to other settings or populations. Additionally, the research objectives were designed to explore specific aspects of the selected topic, which may not cover the entire breadth of the subject matter. As a result, there may be other relevant dimensions or factors that were not fully addressed in this study.

Another consideration is the sample size used in this research since it was determined based on practical constraints. Although efforts were made to select a representative sample, the findings

may not fully capture the diversity of perspectives within the subject under study. Therefore, caution should be exercised when generalizing the findings beyond the scope of the sample.

Data availability and reliability pose another set of limitations as the analysis conducted in this study heavily relied on the data obtained from a selected database and source. Despite the efforts were made to ensure the accuracy and reliability of the data, there may still be inherent limitations or biases within the dataset.

Another limitation is represented by the lack of previous research studies specifically focusing on the main topic of this study is a notable limitation. Despite the growing interest in the field of Robotic Process Automation (RPA), the availability of prior research studies addressing the exact research focus was limited and this may have restricted the depth and breadth of the literature review and theoretical framework, as well as the ability to make direct comparisons or draw firm conclusions based on a strong existing knowledge base.

However, these limitations do not invalidate the overall findings and insights obtained from the study and instead they provide insights into the contextual constraints and considerations that should be considered when interpreting the results. These limitations also open avenues for future research, highlighting the need for more extensive studies with larger sample sizes, enhanced data collection methods, and a deeper exploration of the research topic to further enrich the understanding of Robotic Process Automation (RPA) and its implications.

7. References

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