

FINANCIAL STATEMENT AUDITS: LITERATURE-BASED BENEFITS AND CHALLENGES OF USING ROBOTIC PROCESS AUTOMATION

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ABSTRACT

Robotic Process Automation (RPA) is a new technology that is increasingly being used in various industries to automate repetitive and rule-based tasks. In the context of financial statement audits (FSA), RPA can significantly improve audit quality, efficiency, and effectiveness. The purpose of this paper is to explore and discuss key benefits and challenges from using RPA in FSA. This paper also presents a detailed literature review supporting RPA in FSA, including the factors driving adoption and barriers preventing its implementation. Lastly, the paper provides suggestions and recommendations for audit firms and practitioners regarding the use of RPA in FSA. Overall, this research paper contributes to the growing body of knowledge related to benefits and challenges of using RPA in FSA, and further provides insights into how audit firms can effectively adopt this technology to improve the quality, efficiency, and effectiveness of financial statement audits.

KEYWORDS

Robotic Process Automation, RPA, financial statements, audits, accounting

1. INTRODUCTION

Organizations are witnessing a growing trend in digital services. The use of information systems in enterprises has increased exponentially. The communication between the company, stakeholders, and third parties is conducted digitally. The high volume of information between businesses generates complex data to decode or process into meaningful insights. Interpreting this information requires repeated steps such as cleaning and sorting the data. Traditionally, such process of interpreting information was performed by humans using macros or other tools. In this sense, Robotic Process Automation (RPA) can be defined as tools that help businesses improve the overall efficiency and effectiveness of rule-based operations in a cost-effective and fast manner than other automated approaches [1]. RPA is the application of technology that allows employees in a company to configure computer software or a "robot" to capture and interpret existing applications for processing a transaction, manipulating data, triggering responses, and communicating with other digital systems[2].

RPA is not a standalone term, but a technology defined as a combination of myriad technologies like machine learning, artificial intelligence, and automation. RPA functions by performing repetitive activities that are performed by humans using different applications, spreadsheets, web servers, and electronic mail to complete those tasks. RPA, also referred to as software robotics, is used to automate business processes with significantly lower costs than traditional business solutions [3]. In terms of business processes, RPA is referred to as software configured to perform functions that were previously done manually, such as compiling data from multiple

sources to enterprise resource planning and customer relationship management system. RPA software involves identifying new or existing processes and connecting them to applications that a business uses and scheduling robots to run the process as and when required. RPA can improve the efficiency of functions and reduce costs by 25-40% or even more. It improves efficiency, the overall service, and provides a greater return on investment in less than 365 days.

Traditional financial statement audits(FSA) procedures are time-consuming and require a relatively bigger team to complete an audit. Prior studies have proposed using automated tools in auditing to make FSA procedures more efficient and reduce the number of audit team members engaged in repetitive and non-decision-making tasks [4]. One of the earliest automation technologies used in FSA was continuous auditing, in which electronic spreadsheet software, such as Excel,was used to run macros and automate repetitive auditing tasks. Such software directly affects audit efficiency as it takes less time and labor to complete repetitive tasks. However, the main challenge with continuous auditing is that it works independently, without integrating other accounting applications or systems.

Accounting practitioners have been interested in making repetitive accounting and audit processes simpler, cost-effective, and efficient. RPA is an advanced automated technology that offers a solution to accounting practitioners to perform repeated accounting tasks using bots. RPA involves a range of novel technologies used to automate tasks historically performed by humans. Per [1], RPA “uses software, commonly known as a 'robot,' to capture and interpret existing IT applications to enable transaction processing, data manipulation, and communication across multiple IT systems.” RPA solutions are best applied to high-volume, rule-based, and repetitive [5].

Major accounting firms also use RPA to lower their costs and increase overall tax and advisory services efficiency. For instance, Ernst and Young leverages RPA in various ways and uses it for internal and external processes. Ernst and Young have used RPA in financial statement reconciliations by pulling reports using RPA automated tools. They have also delivered projects using RPA in account audit requests, claims to process, and foreign exchange payments, to name a few [6].Deloittehas used RPA software for their internal processes and within client organizations to use automation involving digital data, tasks that are prone to error, and rules-based processes [1]. RPA solutions are cost-effective and provide several other benefits, such as scalability, decreased cycle times, detailed data capture, and allowing time to innovate [1]. Automating such tasks will help auditors to focus on decision-making tasks. Using RPA tools will also help increase the sample size of the data, which is not possible considering the limited constraint of human processing power. The increase in the sample size of the audit will help increase the audit scope, provide more comprehensive audit reports, and improve overall audit quality.

What sets RPA apart from other automated tools used to automate business processes is that the RPA works similarly to humans using a software presentation layer. RPA can be compared to using macros in Microsoft Excel that automate individual tasks. The primary difference is that RPA tools can work with any server software. RPA tools consist of an interface that generates a set of actions or rules when a user performs a process that needs to be automated. The RPA tools can read reports, identify data, enter entries to an enterprise resource platform system, and send the report as an email attachment with certain modifications. A user can track all the processes performed by RPA in realtime.

RPA helps streamline workflows, which helps make companies more profitable, responsive, and flexible. By eliminating mundane or repetitive tasks, RPA increases employee productivity and satisfaction. RPA is intrusive and can be implemented rapidly to accelerate technological

transformation. The following section will delve into the various advantages that RPA brings to the FSA process, including increased accuracy, improved efficiency, and enhanced risk management capabilities.

The literature review in this research paper adopts a systematic and well-organized structure to explore the benefits and challenges of using RPA in FSA. The review begins by providing a comprehensive introduction to RPA and its application in the FSA. It then proceeds to highlight the various benefits of RPA in FSA, such as increased efficiency, enhanced accuracy, and cost reductions to management, among others. The review then delves into the challenges associated with implementing RPA in FSA, including technological limitations, ethical considerations, and potential job displacement, to mention a few. Furthermore, the review synthesizes and analyzes a range of scholarly articles, industry reports, and case studies to present a balanced perspective related to the use of RPA in FSA. Overall, the organizational structure of this literature review ensures a coherent flow of information, enabling readers to gain a deep understanding of the advantages and hurdles associated with integrating RPA in FSA.

2. BENEFITS

In general, benefits of using RPA in FSA include increased accuracy, improved efficiency, enhanced risk management capabilities, and the ability to free up auditors' time for higher-value tasks. Process automation means using robotics and cognitive technologies to perform rules-based tasks that are mundane. The use of RPA to perform repeated tasks, such as those in FSA, provide employees to concentrate on core business tasks. Using RPA in organizations' financial audits offers many benefits, including:

- Cost reduction – Using RPA can result in a 20-40% reduction in audit costs, allowing auditors to execute tasks around the year, and generate accurate computations, free of errors (compared with similar tasks performed by humans). RPA software or tools are one-time investments and cost significantly low than hiring a full-time employee.
- Higher efficiency – RPA tools improve efficiency in FSA by reducing cycle times to complete a process. RPA can perform tasks that will usually take two to four employees compared to humans. There is no need for frequent training as it does not require regular manual interaction.
- Future Audit Projections – RPA tools gather and organize information rapidly, and organizations can use this information to predict future audit trends and optimize their processes. Data analytics is one of the core benefits of using RPA tools. Data analytics is a time-consuming task and, when performed manually or using traditional methods, will take more time and may contain errors. The accessibility to analytics data in realtime also helps implement adequate audit controls and achieve regulatory compliance.

The benefits of using RPA in FSA are similar to using it in any other industry. It is the automation of repetitive and high-volume tasks. When there are considerable cost benefits and rules-based and standardized processes, only RPA integration will be fruitful. Few benefits of using RPA in FSA can be seen in automating accounts receivable, accounts payable, account reconciliations, tax, and financial reporting processes. The use of RPA to automate accounts receivable tasks includes automating tasks such as Days Sales Outstanding, which relies on humans. RPA tools help in issuing and emailing invoices automatically. RPA can help to input information from multiple systems. RPA processes can send invoices to the employee responsible for the accounts payable to approve the transaction and set up reminders. RPA tools also ensure that purchase orders are in-sync with the invoice and if there are any discrepancies with the user. RPA bots can streamline the reconciliation process by gathering and checking transactional data from multiple

sources, approving records with no errors, and providing notification for any discrepancies. Some benefits in the reconciliation process include extracting data from files, balancing comparisons, finding missing invoices, sending reminders, and creating journal entries.

[7] concur with the benefits above and stress improved audit efficiency and effectiveness. The research paper of [7] looks at RPA from an implementation point of view, and supports how RPA can reduce the time and financial liability associated with completing and processing FSA. Moreover, according to [8], RPA bots can automate most of the tax processes by gathering, creating tax basis, report creation, updating workbooks, and tax report submission. Financial performance is necessary to track profit and loss statements every day. Profit and loss reports are a mundane and time-consuming task. RPA can also help with such FSA tasks by providing real-time reports free of errors which are essential for forecasting financial accuracy. RPA can automate tasks such as generating balance sheets, income statements, variance analysis, and financial reports for management, among others [8]. In the next section, we will explore common challenges of using RPA in the FSA.

3. CHALLENGES

Identifying and addressing the challenges that organizations may encounter when implementing and utilizing RPA in the FSA is crucial for ensuring successful adoption and maximizing the potential benefits of this technology. In their study, [8] stated that even though automating the FSA processes has improved audit effectiveness and efficiency, such technology comes with its share of challenges. RPS focuses on automating a single task and not on integrating different processes or how the information garnered from these processes can be interpreted across various systems [8]. This poses a significant challenge in implementing RPA in auditing, which might not make the auditing process efficient and cause the actual audit process to remain labor-intensive. In addition, using RPA can be a learning curve, especially for auditors unfamiliar with using automation systems for financial accounting. Literature, including [7] has documented that using RPA can result in a 35 to 55% project failure rate.

Additionally, when implementing RPA, there can be difficulty with RPA scaling and how management adapts to the new system [9]. Tasks that are mundane, time-consuming, and require more labor hours using different systems can be automated using RPA. Furthermore, tasks that do not involve human interaction during the whole process are easier to automate and work in favor of improving the efficiency of the auditing process. Another challenge when adopting RPA identified by [7] is the complexity that can arise during using RPA, for which the audit manager needs to be more proficient in technology-related skills than the RPA software providers advertise.

Another common challenge identified when implementing RPA at the FSA of an organization involves how will the technology needs to be managed. While implementing RPA, challenges in the form of making an informed decision, hiring experienced professionals, training the staff in using RPA, management of the newly implemented automated system, and data security are relevant problems that need to be adequately studied to identify mitigating steps to ensure that these challenges do not hinder the actual benefits of using RPA [10]. Other challenges that can affect FSA, according to [11] include scalability and reliability of RPA. An organization might want to use RPA within their FSA, but may not scale its use in their organization. For example, an organization may integrate RPA for department-specific processes and not every department. For instance, one department of an organization is using RPA proactively. However, other departments, such as sales, auditing, customer service, and production, which are not using RPA, will potentially not be able to match the effectiveness and efficiency that comes with the process

of using RPA. With this approach, it becomes difficult for businesses to utilize the benefit of RPA for the entire organization.

Technological issues in the form of poor interface design, operational bugs, or inadequate security measures can also introduce unplanned idle time that can affect the workflow of auditing financial statements [11]. Hence, employees responsible for using RPA in their organization must have a step-by-step plan to account for these issues beforehand. Also, if the organization does not take the help of experienced professionals, additional risks in technical glitches, software testing, and maintenance errors might hinder the whole process. Another significant, relevant challenge relevant to using RPA for financial statements is that RPA may not be the perfect choice for tasks requiring human decision-making elements, involving uncertainty, or occurring infrequently [12]. Organizations should look for easy wins when implementing RPA first; complex and subjective tasks should be avoided and only used with RPA with enough experience and mitigation strategies to control the risks associated with using RPA.

The challenges associated with RPA are relevant; they are present and need to be studied. A study conducted by [13] found that although RPA can potentially uplift the value of the service provided by auditors in FSA, little empirical evidence exists regarding its use within audit settings which might involve high failure rates and relatively slow adoption. Survey evidence points out that auditors' lack of set-by-step RPA guidance is an important practice-relevant challenge.

It is certainly crucial to understand that RPA offers several advantages in the FSA process for generating financial statements, but challenges exist and need to be dealt with. Next, a thorough literature review regarding the use of RPA in FSA is presented and supported.

4. LITERATURE REVIEW

According to the literature, the current benefits associated with using and implementing RPA in FSA outweigh their challenges. In their study, [14] combined technologies such as automatic systems, machine learning, artificial intelligence, and robotics as the basis for structuring and developing the framework for RPA. The framework demonstrated that it works by replicating today's workforce's activities using existing core applications, accessing websites, and manipulating spreadsheets, documents, and emails to process tasks. The advantages associated with RPA are not just related to cost reduction. Other advantages include reduced cycle times for making FSA, improved effectiveness and efficiency, the ability to facilitate financial data from one or multiple sources in different formats, manages, process interprets the data according to established rules, ability to communicate the result to a different digital system, trigger another task on these systems, or create an alert. This technology can help accountants generate financial statements with improved time efficiency and create real-time access to financial data. By doing this, the auditors are able to report and analyze the financial statements simultaneously and continuously. However, it is essential to note that RPA is not replacing accountants; it helps them get their job progressively and positively and enables them to focus on their organization's core competencies.

In their study, [10] identified risks associated with using RPA in FSA. RPA not only poses a risk to accounting institutions and firms, but it can also potentially cause a large number of discrepancies if its capabilities are not studied and used correctly. Once the software is coded with instructions, it will work independently on the allocated tasks. However, since it is software, there is room for potential errors with some level of certainty. An error could go undetected for a more extended period, and once it is identified, it would be difficult to determine the issue and its causation. If businesses are willing to invest money and take the help of professionals to

implement controls during the implementation stage, RPA can be a good decision for them. However, if the RPA is not provided with a solid and accurate foundation, it could damage the task it was intended to do in the first place.

Historically, some FSA procedures have been mundane and time-consuming [14]. In order to remove human auditors from completing mundane, repetitive, and low-judgment audit tasks and use their skills on tasks requiring professional judgment, prior literature proposed to replace labor-intensive audit tasks with automation. Commercial audit analytics software and electronic spreadsheets have been widely employed to automate tests and run analyses in recent years. Although technology improves audit efficiency, auditors mainly perform integration across multiple systems or applications, meaning that the external audit is still exhaustive [8]. For this reason, there has been much interest by practitioners in changing their processes by introducing robotic automation and taking advantage of RPA. Many identify the term RPA for performing day-to-day financial processes by automating how people interact with different applications or analyses with automation and following simple rules to make decisions. [8] conducted a study and proposed a framework split into four stages to apply RPA in the FSA process. The framework described the findings of a pilot study used for automating the audit confirmation process. The framework was divided into the following audit confirmation stages:

- 1) Procedure selection
- 2) Procedure adaptation
- 3) Execution
- 4) Evaluation and operation

The study found that using RPA, the software on its own carries out RPA-based audit processes, giving the audit personnel time to perform decision-making tasks that require professional judgment. Another advantage of RPA identified from the study was that it can reduce the number of human errors, such as verifying confirmation amounts, mistakes in workpapers, and disregarding red flags. Once coded, the RPA software performed the tasks and analyses according to audit standards and pre-defined rules. However, one aspect that was missing from the study related to how the scale and use of RPA can create issues for the organization may be using it for the first time. Additionally, challenges and future research areas for using RPA for the auditing process are to design a study that focuses on how auditors who are not used to using automation streamline their auditing process. This future study can help understand the challenges that might present themselves in the auditing process.

In their study, [3] identified challenges and opportunities in robotics applications to financial services. Specifically, [3] identified several issues in previous projects that have used RPA. The first issue identified was that the organization using RPA for the wrong process. Utilizing RPA in a highly complex process is one of the most common mistakes. The highly complex process results in high automation costs, which could have been better spent on tackling other issues in other processes. These processes and challenges are addressed because they might not help agents and offer considerable time and work efficiency improvement savings. The second issue identified in the study related to the wrong delivery methodology. This means that companies often try to apply an overly complicated software delivery method to the RPA, leading to delayed results. Another critical issue identified in the study is related to organizations using RPA neglecting the IT infrastructure required to implement RPA for their auditing process effectively. Another issue identified in the study is that all work is done due to automation, and the organization will start getting a return on investment. While current RPA tools can automate the majority of sections of the auditing process, they cannot do everything. Hence, companies

often computerize many sub-processes but miss the opportunities to augment RPA and automate the whole process [3].

In another study, [7] focused on the implementation of RPA when working with the preparation of financial statements. The research of [7] focused on the following:

- Task suitability for RPA, which focused on identifying the characteristics of the tasks at hand in a FSA that could be automated using RPA. It also looked into which accounting or finance processes in RPA could be implemented, how these processes were identified to use RPA, and how those process could instead not be appropriate to be used for automation.
- RPA Implementation, which looked at why companies would want to use RPA. An auditor might want to consider the following: What challenges can a company face when integrating RPA into their auditing process? Which steps were taken by the organization to assess any relevant threats associated with RPA?
- Performance impact, which described any consequences of using RPA on the performance of the organization.

The study by [7] adopted an exploratory approach and presented an analysis of open-ended interviews with RPA practitioners and sources from companies that represented different industries and organizational sizes. The study provided in-depth insight into RPA user preference and thoughts captured through open-ended interviews conducted with a small group of organizations from varied industries implementing RPA to streamline auditing tasks. The study results showed that financial statement auditors face difficulty by RPA complexity when trying to understand a process at a base level and document the failures of each process. The study also showed that the company personnel needs to be more open to using technology and show the ability to learn coding skills that can help them better use RPA. RPA implementations dictate an in-depth IT involvement than organizations initially anticipated. The study concluded that as RPA use becomes more common, future studies could focus on the long-term effects of RPA and related technology implementation on organizations and their employees, job satisfaction, and retention.

In regards to the impact of RPA on accounting and audit processes, [16] sought to explain how RPA affected accounting and audits of financial statements, and further suggested research directions for the future. Per [16], previous studies revealed research gaps between RPA and accounting and audits of financial statements. More specific, the study performed by [16] identified gaps at the initial phases of using RPA in FSA, like (RPA) software integration processes. Other gaps included costs of creating additional autonomous processes and regularly updating the existing RPA processes, task execution, and overseeing the scaling of these processes and securing the auditing processes, among others. Automating processes that relate to accounting and FSA without adequate review and management lead to implementation errors and/or reduced efficiency, disallowing the interest and use of RPA when working with, and generating, FSA [16].

In their study, [17] used a descriptive qualitative approach to discuss the development of the RPA and financial auditing process. The study used data to support the benefits, rewards, and efficiencies of automation in the financial auditing process. However, the study also showed limitations and challenges that need to be considered. Auditor's reluctance to use automation, problems of legality, and accountability if an error occurs, are some of these examples. The study also used qualitative research to review the audit process using RPA, especially financial audits, including financial statements. Particularly, [16] used the inquiry method to gather observable, experimental, and quantifiable evidence. The study identifies weaknesses and/or challenges of using RPA in auditing from the auditor's legal obligations. Human auditors can take

responsibility for their negligence; however, when using RPA, who is to be blamed? This is a challenge that auditors need to consider when using RPA for auditing financial statements. An area of concern is deciphering which tasks need to be integrated using RPA. Inappropriately automating business processes can result in savings that may not be that substantial. Of course, the process that RPA can replace is a mundane, monotonous, significant volume and requires much personnel to carry out the task.

A new complicated threat is the resistance of traditional auditors. The use of RPA is often translated as a decrease in personnel. Senior auditors feel threatened as they cannot sync with the latest technological developments [14]. In addition, vouching, tracing, and footing, tasks that junior auditors perform, are also worried that using robots can quickly replace these tasks [8].

Other literature reviewed within this research examined ten case studies of companies integrating RPA and presented a series of lessons learned from the practice of using RPA [15]. This study focused on RPA implementation in FSA of organization within various industries, including telecommunications, insurance, finance, banking, public sector, and public administration. Implementation and use of RPA was impacted because RPA works by communicating with others using the front-end level. Due to this, RPA is considered inferior to traditional back-end system automation. Although RPA showcases the top front-end solution in digital transformation, the study conducted by the authors in [15] prompted organizations to check their business processes periodically in order to identify and augment processes suitable for RPA. For example, RPA can be used for a high volume of tasks; rule-based or low-complexity tasks are suitable for automation.

Another study reviewed herein showed other RPA-related issues and risks, such as operational, financial, and regulatory risks [16]. Robots' experimental algorithms may result in monetary losses and impact the precision and reliability of internal and external financial statement reporting. Additionally, the implementation of automation to replace human personnel can decrease staff morale, based on [16]. Alternatively, studies have shown that when personnel is provided with training, they tend to display excessive optimism and successful completion of automating mundane tasks, whereas, on the other hand, configuring complex automated processes requires significantly more training and coaching. In addition, technology selection (e.g., autonomous systems, etc.), especially integrated at higher levels, may put additional strain on the company's IT infrastructure [18]. The automation's capacity must be estimated in advance. Backups should be stored in failover servers, and sufficient storage should be secured. If this is not considered, there is the potential to lose data, ineffective service, and an overall disadvantage in developing financial statements during the auditing process. Moreover, standardized and mature processes are also optimal candidates for automation. Business process transparency facilitates the selection of mature processes for automation.

5. CONCLUSION

Emerging technologies like RPA bring many opportunities to organizations to stay ahead and remain competitive, but they also expose them to a new set of unknown risks. Management must do their homework to clearly understand the benefits of RPA before considering its adoption. Opportunities resulting from enabling robots to perform mundane and time-consuming tasks allow employees to focus their time, energy, and effort on more strategic, high-value activities consistent with the company's mission, goals, and objectives. Alternatively, challenges, risks, and/or obstacles, such as the ones described above, must be studied in detail and tackled in an effective and efficient manner. Establishing procedures to ensure that the RPA implementation is aligned with company goals and objectives, management is on board from day one, and relevant personnel possess the required technical knowledge, are all examples of effective controls to have

prior to implementation. Most importantly, these controls or procedures help minimize an unfavorable impact to the organization. It is only by understanding, preparing for, and addressing the above that RPA may be capitalized upon, and organizations may think about growing and expanding its usage.

In this paper, literature related to the use of RPA in the audits of financial statements has been reviewed and documented. The literature has highlighted common benefits and challenges of using RPA in FSA. Moreover, the literature reviewed herein has examined the current state of RPA in regards to FSA of organizations, including factors driving its adoption and barriers preventing its implementation. Overall, the research presented contributes to the growing body of knowledge related to benefits and challenges of using RPA in FSA, and have further provided insights into how audit firms can effectively adopt RPA to improve the quality, efficiency, and effectiveness of FSA.

6. LIMITATIONS AND FUTURE SCOPE

The literature review performed in this research paper exhibits certain limitations and deficiencies that need to be acknowledged. Firstly, the review primarily focused on studies published in the English language, which could introduce a language bias and exclude valuable insights from non-English literature. Additionally, the review predominantly relied on articles from a specific time frame, potentially overlooking older studies that could provide essential historical context or comparative analysis. Another limitation is the limited geographical scope of the review, as it focused primarily on research conducted in a particular region or country, neglecting valuable perspectives and findings from other parts of the world. Furthermore, the review did not include unpublished studies, potentially missing out on alternative viewpoints or novel research findings. Lastly, the literature review performed herein might have overlooked studies with negative or inconclusive results, leading to a potential publication bias and an incomplete understanding of the research topic. Overall, while the literature review provides a valuable synthesis of existing research related to benefits and challenges of using RPA in FSA, these limitations and deficiencies should be considered when interpreting the findings.

In this research paper, the literature review serves as a foundation for understanding the existing body of knowledge in the field. However, there are several future scopes and improvements that can be explored to enhance the literature review conducted herein. First, incorporating more recent studies and publications beyond the current knowledge cutoff date would provide an up-to-date overview on the topic of RPA in FSA. Second, expanding the search criteria to include a wider range of databases, journals, and sources can ensure a more comprehensive coverage of relevant literature. Third, utilizing advanced data mining techniques and text analysis tools can assist in uncovering hidden patterns, themes, and connections within the literature, enabling a more nuanced understanding of the research landscape. Collaborative efforts, such as involving multiple researchers or conducting systematic reviews, can help minimize potential biases and increase the reliability of the findings. Finally, incorporating diverse perspectives and considering interdisciplinary sources can enrich the literature review performed in this paper, providing a more holistic view related to the use of RPA in FSA. By implementing these future scopes and improvements, the literature review conducted herein can be strengthened and contribute significantly to the advancement of knowledge in the particular field.

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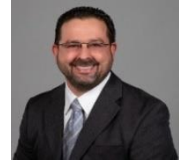
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REFERENCES

- [1] Deloitte. (2021). Robotic process automation. Deloitte United Kingdom. <https://www2.deloitte.com/uk/en/pages/innovation/solutions/robotic-process-automation.html>
- [2] What is Robotic Process Automation? (2021). Institute for Robotic Process Automation & Artificial Intelligence. Retrieved from <https://irpaai.com/what-is-robotic-process-automation/>
- [3] Lamberton, C., Brigo, D., & Hoy, D. (2017). Impact of Robotics, RPA and AI on the Insurance Industry: Challenges and Opportunities. *The Journal of Financial Perspectives*, 4(1). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3079495
- [4] Otero, A. R. (2015). Impact of IT auditors' involvement in financial audits. *International Journal of Research in Business and Technology*, 6(3), 841-849. DOI: 10.17722/ijrbt.v6i3.404
- [5] KPMG. (2020, January 28). RPA case studies for technology companies. <https://home.kpmg/us/en/home/insights/2017/10/robotic-process-automation-case-studies-for-tech-companies.html>
- [6] Diepeveen, B., Matcher, J., & Lewkowicz, B. (2016). Robotic process automation Automation's next frontier. EY. https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/digital/ey-robotic-process-automation.pdf
- [7] Kokina, J., & Blanchette, S. (2019). Early evidence of digital labor in accounting: Innovation with robotic process automation. *International Journal of Accounting Information Systems*, 35, 100431. <https://doi.org/10.1016/j.accinf.2019.100431>
- [8] Huang, F., & Vasarhelyi, M. A. (2019). Applying robotic process automation (RPA) in auditing: A framework. *International Journal of Accounting Information Systems*, 35, 100433. <https://doi.org/10.1016/j.accinf.2019.100433>
- [9] Januszewski, A., Kujawski, J., & Buchalska-Sugajska, N. (2021). Benefits of and obstacles to RPA implementation in accounting firms. *Procedia Computer Science*, 192, 4672-4680. <https://doi.org/10.1016/j.procs.2021.09.245>
- [10] Sturgill, O. (2020). An Analysis of Robotic Process Automation for Accountants [Master's thesis]. <https://dc.etsu.edu/honors/638/>
- [11] Valgaeren, H. (2019). Robotic Process Automation in Financial and Accounting Processes in the Banking Sector [Master's thesis]. <https://www.scripriebank.be/scriptie/2019/robotic-process-automation-financial-and-accounting-processes-banking-sector>
- [12] Tejas, T., Zhang, A., Zhao, K., & Zhou, Y. (2018). Robotic Process Automation for Auditing. *Journal of Emerging Technologies in Accounting*, 15(1), 1-10. <https://meridian.allenpress.com/jeta/article/15/1/1/9413/Robotic-Process-Automation-for-Auditing>
- [13] Eulerich, M., Pawlowski, J., Waddoups, N., & Wood, D. A. (2020). A framework for using robotic process automation for audit tasks. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3651028>
- [14] Kaya, C. T., Turkyimaz, M., & Birol, B. (2019). Impact of RPA Technologies on Accounting Systems. *Journal of Accounting & Finance*, (82), 235-249. <https://dergipark.org.tr/tr/download/article-file/664207>
- [15] Osman, C. (2019). Robotic process automation: Lessons learned from case studies. *Informatica Economica*, 23(4/2019), 66-71. <https://doi.org/10.12948/issn14531305/23.4.2019.06>
- [16] Jędrzejka, D. (2019). Robotic process automation and its impact on accounting. *Zeszyty Teoretyczne Rachunkowości*, 2019(105 (161)), 137-166. <https://doi.org/10.5604/01.3001.0013.6061>
- [17] Handoko, B., Lindawati, A., & Mustapha, M. (2021, July). Robotic Process Automation in Audit 4.0 [Paper presentation]. The 2021 12th International Conference on E-business, Management and Economics.
- [18] Otero, A. R. (2019). Optimization methodology for change management controls using Grey Systems Theory. *International Journal of Business and Applied Social Science*, 5(6), 41-59. DOI: 10.33642/ijbass.v5n6p4

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