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Utilizing Robotic Process Automation and Artificial Intelligence in Auditing to Mitigate Audit Risks

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Abstract. Automating repetitive tasks significantly increases the efficiency of operations by identifying repetitive tasks, then choosing the appropriate tools for automation, designing successful workflows, testing, iteration, monitoring the performance of operations continuously, and making the necessary adjustments, which helps auditors accomplish their mission. This research aims to highlight the urgent need to develop the skills of accountants and auditors to maintain alignment with the swift advancements in digital technology in the accounting field to reduce fraud risks and protect stakeholders. The study relied on the applied aspect of 157 questionnaires distributed to a sample of auditors working in auditing firms and Federal Financial Supervision Bureau auditors. We used a five-point Likert scale to answer the questions on the questionnaire and the SPSS V.25 statistical package to look at the data and test our research hypotheses. We used Pearson correlation, simple regression, the coefficient of determination and interpretation R2, and the standard coefficient of regression B. Our research showed that using robotic process automation and artificial intelligence in auditing would make audited financial statements more reliable. Adding auditors' skills, artificial intelligence, and process automation will also significantly mitigate inherent control and detection risks. Furthermore, enhancing the quality of auditing.

Keywords. RPA, AI, Auditing, Audit Risks

1. Introduction

Organizations remain in the nascent phases of deploying robotic process automation and artificial intelligence systems, and they still need to fully leverage automation's substantial benefits. Due to the swift technological progress, the accounting and auditing sector progressively utilizes robotic process automation and artificial intelligence. Computer automation presents significant problems for complex auditing tasks requiring auditor discretion and originality (Gotthardt et al., 2020). Auditors' understanding and awareness of AI impact their comfort and proficiency with technology. This indicates that adequate knowledge and awareness of artificial intelligence affect auditors' acceptability and proficiency in utilizing technology (Afroze & Aulad, 2020) and identifies three primary problems that impede the application of artificial intelligence. (1) Deficiency in organizational data capabilities; (2) Insufficiency of individual competencies about artificial intelligence; (3) Persistent general impediments to the deployment of this innovation. The need for management's understanding of artificial intelligence for successful organizational implementation and the successful

incorporation of AI inside enterprises depends on various innovative organizational competencies and individual abilities, which, if absent, may hinder its implementation. To resolve this, enterprises should consider talents beyond data science and data engineering necessary for AI production (Bérubé et al., 2021).

Artificial intelligence profoundly influences accounting, auditing, and tax strategy within management accounting. Nonetheless, while AI assumes a fundamental part in business administration (Janaki & Clifford, 2021), As the auditing profession embraces AI for its operation, implementation of audit activities, and supervision of advisory functions, this study clarifies how researchers disagree and agree about the role and impact of applying AI to external auditing. According to the findings, some groups are on board with AI implementations because of their benefits, while others are skeptical. The benefits include improved audit quality, more efficiency and effectiveness (thanks to expanded audit coverage), and less labor and time spent executing the audit. Some people are against it because it could lead to biases (loss of function), violate the ethical values of the auditing profession, and make it harder to coordinate human and automated tasks. (Mpofu, 2023). While AI technologies and predictions may not be widely used in auditing, they hold immense promise for future generations. Machine learning algorithms, expert systems, and other forms of artificial intelligence can supplement human predicting abilities, and automation can help with forecasting in general. Improving audit quality and reducing audit risk can be achieved through IT to gather exhaustive data on auditor positions. (Doloksaribu & Firdaus, 2022). Incorporating artificial intelligence technologies into accounting and auditing may yield advantages such as enhanced accuracy and increased automation. Accountants and auditors must continuously study to stay abreast of advancements in artificial intelligence, and it is essential to cultivate technological skills to integrate AI tools and systems into their enterprises efficiently; using artificial intelligence in auditing processes improves audit quality and will increase it further. Accountants and auditors must participate in continuous education to stay updated on advancements in artificial intelligence, and it is essential to cultivate technological competencies for the effective integration of AI tools and systems within their organizations. (Mohamed, 2023).

Incorporating AI into auditing processes now boosts audit quality and is likely to do even better in the future. Adopting AI is crucial for accountants and auditors because it enhances audit quality through more reliable, accurate, and timely financial reporting. Nonetheless, the character of audit services may evolve, and while artificial intelligence will assist auditing procedures, human involvement will continue to be essential. In the coming decades, intelligent systems will progressively supplant people in decision-making positions (Dagunduro et al., 2023); (Musa & Lefkir, 2024). These solutions will expedite laborious audit processes, improve data analysis proficiency, and facilitate more precise risk evaluation and fraud identification. The auditor's role will be redefined to emphasize analysis and decision-making due to technological advancements in artificial intelligence that will increase the efficiency and curacy of auditing. Accordingly, auditors need to be well-versed in data analytics using AI (Mitan, 2024).

This work is a significant attempt to apply robotic process automation to elements related to audits in the Iraqi context. This gives a whole picture of how this technology can improve the efficiency of auditing procedures.This study adds a new perspective to the existing literature by incorporating robotic process automation technologies to investigate the relationship between audit risks and report quality. Previous research has also tackled this topic. According to this study, integrating AI into auditing practices is crucial because AI helps create new methods and tools that improve audit quality by lowering audit risks to an acceptable level,

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increasing audit efficiency and accuracy, and taking the auditing profession in Iraq to another level.

2. Literature review

2.1 Overview of Robotic Process Automation

Automation originates from the Greek word "automatos," signifying work performed without human involvement or with minimal human intervention. (Colonna, 2021) Automation has a long-standing history. For many years, machines have carried out tasks that previously required humans. This process autonomously regulates a function or task, aiming to minimize human participation by substituting human labor with machine input. Automation originated during the Industrial Revolution, characterized by the replacement of human labor with machines in factories (Vanhuvaone, 2023). Malini views robotic process automation (RPA) as a software technology enabling the development of virtual robots to execute repetitive digital tasks traditionally carried out manually. Robotic Process Automation (RPA) can engage with any application or system similarly to human interaction. RPA encompasses robots, defined as machines that replicate human tasks; processes, which refer to the ordered steps necessary to complete a specific task; and automation, characterized as a machine's capability to execute a task independently of human involvement. Robots emulate human capabilities in screen comprehension data identification and extraction (Malini, 2021). Some perceive it as a technological application. Workers can set up software "robots" to understand and process data from preexisting applications for reaction triggering, processing transactions, data modification, data manipulation, response triggering, and communication with other digital systems (Khankhoje, 2024). Automation represents a transformative technology that enables organizations to enhance operational productivity by substituting human labor with robotic systems. Organizations can now create software robots to carry out mundane mechanical processes at the application interface level, freeing human resources for more complicated activities (Onyshchenko et al., 2022). Software robots execute defined tasks, including data reception, sorting, and processing, while maintaining the integrity of the organization's existing programs and business processes (Yatskiv et al., 2020). Software that has already been set up uses business rules and action plans to run a series of operations, activities, transactions, and tasks across multiple software systems that are not directly related to the function being performed. It does this by itself and manages exceptions with the help of humans (Viale & Zouari, 2020).

Attended robots facilitate robotic desktop automation (RDA) by collaborating with humans on specific tasks, such as call centers, where agents utilize the RPA system to manage information while engaging with customers (Langmann & Turi, 2020). In contrast, unattended robots operate through unattended robotic process automation, executing scripts autonomously without human input. This makes them ideal for routine tasks where all execution paths, including exceptions, are predefined and can be programmed. Through copy-and-paste operations, they transfer records between systems via user interfaces (Leno et al., 2021). Hybrid Mode integrates attended and unattended robots to execute lengthy processes comprising decision-making and comprehensive automation phases. The worker initiates the procedure by activating the attended robot, which subsequently engages the unattended robot to carry out the retention process, encompassing the entire automation component (Axmann & Harmoko, 2020). Figure 1 illustrates the categories of robotic process automation.

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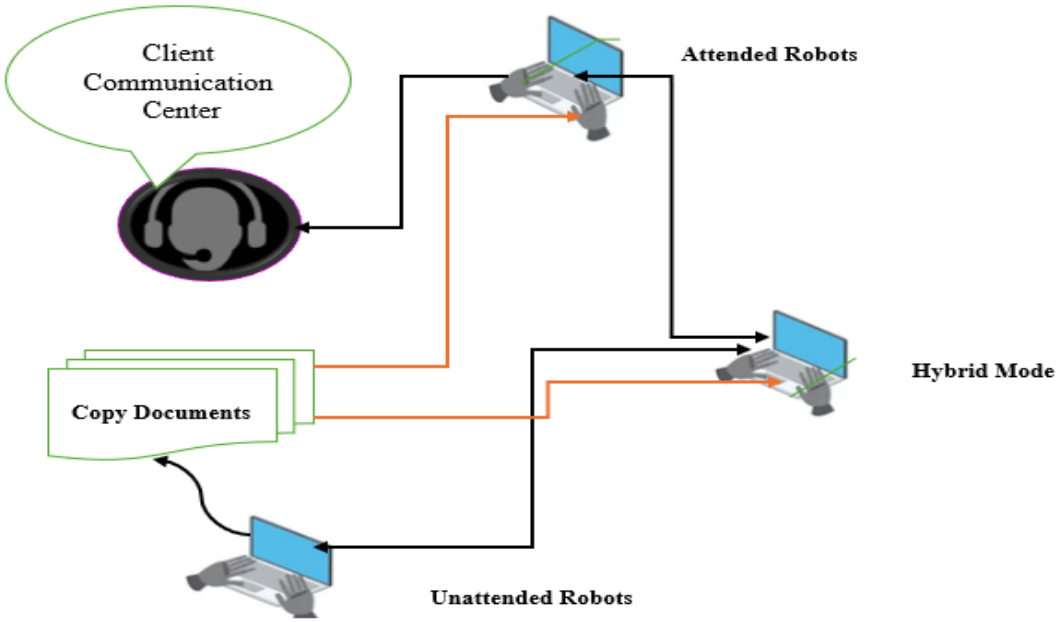

Figer 1: Automation Technologies for Robotic Processes

2.2 The Foundational AI and RPA Technologies

Artificial Intelligence (AI) refers to a machine's capacity to execute cognitive operations commonly linked to human intellect and the creation of computer systems capable of undertaking tasks that usually necessitate human intelligence (Saeed et al., 2023) (Kashif et al., 2024). These tasks encompass reasoning, learning, problem-solving, natural language comprehension, perception, and decision-making. AI systems can analyze data, identify patterns, adapt to evolving conditions, and generate predictions or recommendations (Mitra, 2023) based on algorithms governed by constraints, which are elucidated through representations that facilitate interconnected loop-centric models through explanation and behavior (Test & Broker, 2020). AI encompasses a broader scope than the "laws of thought" framework, and accurate reasoning serves as a beneficial means to attain rationality rather than an essential one. Scientific advancement is more attainable than methods rooted in human behavior or cognition due to the unequivocal and widely accepted criterion of reason (Letheren et al., 2020). Artificial intelligence encompasses three categories: the first category, artificial general intelligence (AGI), can execute many complex activities. It can interpret handwritten documents, identify voices and faces, detect financial fraud, provide medical diagnoses, and operate automobiles (Lumbreras, 2022). The second category, weak artificial intelligence (Narrow), refers to intelligence that can execute a restricted range of straightforward tasks, such as image recognition or language translation. The third category, superintelligence (SI), can exceed human cognitive capacities, including creative thinking and complicated problem-solving (Kamolov & Kaunov, 2021).

Robotic Process Expert systems are programs designed to address intricate issues within a particular domain, offering recommendations, diagnoses, and outcome predictions derived from a knowledge base and models (Deshpande & Kumar, 2018). Neural networks are a facet of artificial intelligence that emulates the human brain via electronic models of neural

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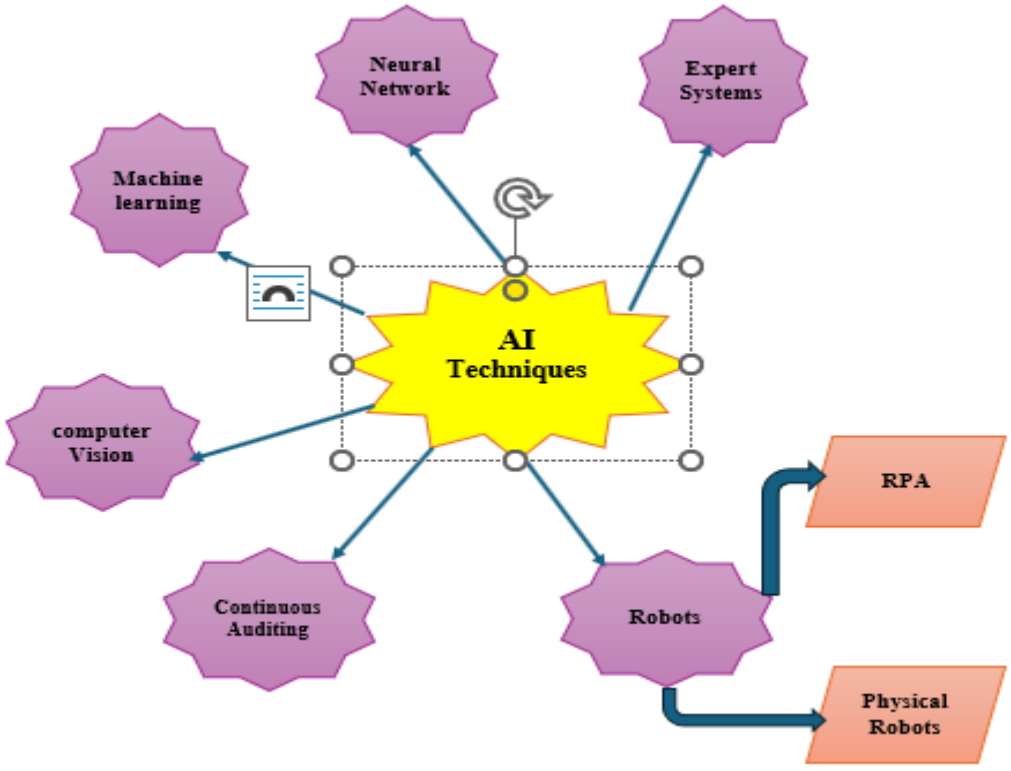
architectures, enabling computers to learn from data and make judgments analogous to human cognitive processes. Robots represent a facet of artificial intelligence known as robotics technology, encompassing the science and technology involved in robot design, construction, and application. (Chukwuani & Amaka, 2020)

Machine learning (ML) is a discipline that enables computers to acquire knowledge from data autonomously without explicit programming, and it employs statistical methodologies to evaluate and comprehend data, including mathematical modeling, visualization, and pattern identification. It is employed in diverse applications, such as assessing company revenue projections and informing investment decisions. It can forecast transaction classification by examining historical transactions. The accuracy of the predictions is contingent upon the quality of the data utilized. The forecasts may also be erroneous if the data is precise or skewed (Zhang et al., 2020). Recent substantial advancements in computing power and data availability have elevated the accuracy rates of computer vision algorithms from 50% to 99% in about a decade. Computer vision is frequently employed in applications including image analysis, classification, and facial recognition (Verbeek & Lundqvist, 2021). Figure 2 illustrates the predominant technology in artificial intelligence, specifically automation technologies.



Figer 2: Key technologies for RPA and AI.

2.3 The Audit Risks

The auditor may give an inappropriate opinion on the financial statements, and in order for the auditor to express his opinion on the financial statements, he designs procedures that help him provide reasonable assurance that the financial statements have been prepared correctly in all material respects, taking into account the possibility of material errors that may

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not be discovered for reasons related to the nature of the use of samples in the audit procedures or the procedures of the internal control system, and that there are three components of audit risk: control risk, detection risk and inherent risk (Mohammed et al., 2021), as audit risk refers to the auditor's unintentional failure to appropriately modify his opinion on the financial statements that have been materially distorted by management or employees (AL-Hajri, 2022), in other words, the auditor expresses an inappropriate audit opinion when the financial statements are materially distorted (Porcuna et al., 2021), and audit risk includes many risks that may arise due to the actions or inaction of auditors during the audit process, which affects the normal development of the audit, in other words, related to the financial revenues and expenses of the institution with the possibility of significant errors and fraudulent operations that escape detection Auditor resulting in erroneous audit conclusions (Xie, 2023), Audit risks may emerge from the growing complexity of the audited organization's activities, non-compliance with auditing standards, restrictions of time and resources, or reliance on outmoded auditing standards (Chen & Guo, 2023). The auditor must delineate the essential aspects of each audit, devise a comprehensive audit plan, and execute targeted procedures to alleviate any risks. The potential for the audited organization to report erroneous account balances or transaction types while having robust internal controls exists in the business realm. This risk originates from the organization's intrinsic characteristics, the operational environment, and the complexity of the financial reporting (Xie, 2023). The intrinsic risks pertain to the nature of the company's operations. A corporation that acquires substantial private funding at several tiers may have increased inherent risks. In evaluating inherent risks, auditors must examine many factors, including the organization's attributes, operational circumstances, and financial status, to pinpoint higher-risk areas and modify the audit strategy as necessary (Dyball & Seethamraju, 2021).

"Detection risk" denotes the external auditor's failure to identify a significant error in an account balance or transaction type, mainly when such errors are aggregated with inaccuracies in other account balances or transactions, as determined by the audit processes conducted (Babiker, 2023). This risk is contingent upon the efficacy of the external auditor's audit methods. The likelihood of non-detection is contingent upon the efficacy of the audit methods and the auditor's professional expertise. The risk of non-detection cannot be eliminated, as auditors typically do not perform a comprehensive investigation. Selecting an unsuitable audit technique and misinterpreting the audit findings heightens non-detection risk. The auditor must evaluate the risks of significant errors and mitigate the risks of non-detection to maintain audit risks at an acceptable level (Arzhenovskiy et al., 2019). Control risks refer to the potential for a mistake to arise that cannot be prevented or identified and rectified promptly by the accounting and internal control system (Fakhfakh & Jarboui, 2022).

The audit risk assessment entails identifying, assessing, and mitigating the risks associated with preparing financial statements. During the audit planning phase, the auditor engages with the entity's management and staff, conducts analytical processes, observations, and inspections, and assesses the business risks that may lead to material misstatements (Porcuna et al., 2021). The audit department requires many technologies for analyzing large datasets to identify potential errors or the risks of significant inaccuracies resulting from dishonest or fraudulent practices (Cardoni et al., 2020). Furthermore, risk assessment is integral to information security management, enabling organizations to identify vulnerabilities and threats while analyzing and mitigating risks (Chandra et al., 2022).

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3. Research Method

3.1 Study Tool Description

External auditors in the Financial Supervision Bureau represent the research community. A sample of auditors was selected in the governorates of the Middle Euphrates (Karbala, Babylon, Najaf, and Qadisiyah), as the number of distributed questionnaire forms valid for analysis reached 157 questionnaires. The questionnaire was divided into three axes. The first axis represents the independent variable (Utilizing robotic process automation and artificial intelligence in auditing) and includes 23 questions. In contrast, the second axis represents the dependent variable (Mitigate Audit Risks) and includes 17 questions. Cronbach's alpha scale was used to measure the questionnaire form's stability and validity. Its value ranges from 0 to 1, and the degree of stability increases closer to 1. Since this questionnaire included three groups of questions, Cronbach's alpha stability coefficient was calculated for each group of these groups.

a. Study of Aims

The primary goal of this research is to determine how much of an impact robotic process automation and AI could have on lowering audit risks in Iraq. It urges auditors and accountants to take advantage of the fast-paced evolution of computer and information technology by highlighting the substantial benefits these technologies may offer. By honing their abilities in these areas, professionals may improve the audit process and the integrity of financial data, lowering the risks of fraud and errors.

3.3 Problem and hypotheses of the study

A new reality for online accounting has emerged due to the lightning-fast development of IT in the last several years. Because of this change, external auditors now face more obstacles than ever before, and the audit process is vulnerable to many threats that could lower the standard of opinion in the final report. With this background, AI and robotic process automation are becoming indispensable tools for auditors. These tools are vital to lessen the impact of audit risks. The primary question that guides this investigation is:

(Is there a relationship and influence between robotic process automation and artificial intelligence and audit risks?)

Based on the above question, the current study will test the following hypothesis:

(There is no statistically significant correlation between robotic process automation and artificial intelligence to mitigate audit risks.)

4. Results and testing of study hypotheses

4.1 Results

The results indicated the independent variable: robotic process automation and artificial intelligence. The examination of the respondents' responses produced the subsequent principal findings:

82.17% of the sample participants assert that employing algorithms to automate robotic activities alongside artificial intelligence will enhance the execution of sanctioned analytical methods to get adequate and timely evidence. The indicator achieved a score of 4.108*, with a standard deviation of 0.739, a coefficient of variation of 17.98%, and a significance level of $\alpha = 0.000$.

85.86% of the sample believed that using advanced algorithms to expand the size of the

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audited sample and audit the data in less time and cost, and this indicator obtained 4.293* points, with a standard deviation of 0.736, which indicates the convergence of the sample's opinions towards using advanced algorithms to expand the size of the audited sample in record time, as the value of the standard coefficient of variation was 17.15% and the value was α=0.000, and 80.76% of the sample believed that using robotic process automation in routine work directs them towards creative thinking, and this indicator obtained 4.038* points, with a standard deviation of 0.706, which indicates the convergence of the sample's opinions towards using robotic process automation and artificial intelligence instead of routine work, as the value of the standard coefficient of variation was 17.48% and the value was α=0.000, and 81.78% of the sample agreed that using robotic process automation and artificial intelligence Artificial intelligence in auditing contributes to improving the auditor's performance in the future. The indicator received a score of 4.098 points with a standard deviation of 0.763, indicating a convergence of the sample's views on using robotic process automation and artificial intelligence in auditing. The coefficient of variation was 18.65%, with a significance level of α = 0.000.

Moreover, 80.25% of the sample participants acknowledge that implementing robotic process automation and artificial intelligence facilitates a reduction in human resources within auditing. With a score of 4.013 points and a standard deviation of 1.006, this indicator received. The coefficient of variation was 25.08, while the value of α was 0.000. Sample members concur at a rate of 83.18% that implementing robotic process automation and artificial intelligence facilitates the execution of intricate auditing jobs lacking viable alternatives. The indicator scored 4.159 points, a standard deviation of 0.561, a coefficient of variation of 13.48%, and a significance level α = 0.000.

Furthermore, 81.53% of the sample participants concur that implementing robotic procedures and artificial intelligence in auditing aids external auditors in safeguarding data from manipulation and client fraud. This indicator performed well, scoring 4.076 points and a standard deviation 0.917. The coefficient of variation was 22.49%, with a value of α = 0.000. Furthermore, 83.57% of the sample participants assert that professional experience with robotic process automation and artificial intelligence mitigates the associated dangers. This indicator scored 4.178 points, accompanied by a standard deviation of 0.805. The coefficient of variation was 19.26%, with a significance level of α = 0.000.

The key findings derived from the study of the sample's responses for the dependent variable (mitigate audit risks) were as follows:

83.44% of the sample concur that the information included in the external auditor's report, considering process automation and artificial intelligence, aids in mitigating control risks. With a standard deviation of 0.769, this indicator received 4.172 points. The coefficient of variation was 18.44%, with a value of α = 0.000. Furthermore, 82.93% of the respondents concur that they employ suitable audit procedures to mitigate detection risks; nonetheless, these measures are inadequate. This indicator scored 4.146 points, accompanied by a standard deviation of 0.639. The coefficient of variation was 15.40%, corroborating the value of α, which was α=0.000.

Furthermore, 81.72% of the sample anticipates using robotic process automation (RPA) in the audit. The absence of artificial intelligence significantly mitigates audit risks. A score of 4.086 points and a standard deviation 0.760 for the variable suggest that the sample's opinions converge. The standard value of 18.60% that the coefficient of variation achieves supports the value of, where =0.000.

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a. Testing of study hypotheses

The study's hypotheses will be tested using statistical methods. Data was examined to ascertain the role of AI and robotic process automation in auditing and mitigating audit risks. We used Pearson's statistical correlation to establish a link between our two data sets. The next step was to examine the relationship between the independent and dependent variables using simple regression. To determine how much the dependent variable changes for every one standard degree change in the independent variable, you can use the standard coefficient of regression B. Finding the extent to which the independent variable influences changes in the dependent variable can also be done using the coefficient of determination or interpretation R2. For the primary hypothesis (There is no statistically significant correlation between robotic process automation and artificial intelligence to mitigate audit risks), the SPSS computer found the following linear equation for a simple linear regression:

$$y_i = A_0 + B1xi + e_i \text{.....(1)}$$

Where:

y_i= Dependent variable (RPA and AI).

A0= Constant of the regression equation represents the dependent variable's value when the

independent variable's value equals zero.

$B1xi$= The slope of the regression function measures the effect of the independent variable (mitigate audit risks) on the dependent variable (RPA and AI).

The results were as follows.

e_i= Estimation errors are what are called statistical residuals

Table 1: Correlation matrix between the independent variable and the dependent

		RPA and AI	Mitigate Audit Risks
Pearson Correlation	RPA and AI	1.000	0.874**
	Mitigate Audit Risks	0.874**	1.000
Sig. (1-tailed)	RPA and AI		0.00
	Mitigate Audit Risks	0.00	
N	RPA and AI	157	157
	Mitigate Audit Risks	157	157

Looking at the table above, we see a statistically significant correlation between the use of robotic process automation and artificial intelligence in auditing and reducing audit risks, as the correlation coefficient between them reached (0.874**) at a significance level of (0.000). This result supports the rejection of the null hypothesis and the adoption of the alternative hypothesis, i.e., a statistically significant correlation exists between the utilization of robotic process automation and artificial intelligence in auditing to mitigate audit risks.

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Table 2: Estimating the parameters of a simple linear regression model to measure the impact of using robotic process automation and artificial intelligence in auditing to mitigate audit risk

independent variable	regression equation			Sig.	R 2	Decision
RPA and AI	Y=0.495 +0.871 X1	2.388	501.220	0.000	0.764	Reject the null hypothesis
a. Dependent Variable: mitigate audit risk						

Looking at the table above, we notice a significant effect of using robotic process automation and artificial intelligence in auditing to mitigate audit risks. That is the probability of a type I error a=0.000; the estimated equation was Y=0.495+0.871 X1, which explains 76.4% of the nature of the relationship between X and Y, meaning that 76.4% of the changes in reducing audit risks are due to the change in the use of robotic process automation in auditing. The calculated F value for the simple regression model was (501.220) at a significance level of (0.000). So, the decision is to reject the null hypothesis with a 0.000% chance of making a type I error (rejecting the null hypothesis, which is correct). This shows that using robotic process automation and artificial intelligence in auditing greatly impacts mitigating audit risks.

5. Conclusion

Remember that accountants and auditors still need human oversight; AI cannot cut it. On the contrary, it focuses on creative work, allowing them to deliver better client value and prioritize efficiency and value. To interpret outputs, verify the validity of results, and issue more informed decisions based on the insights provided by these modern systems, auditors and accountants will continue to play an essential role. Human oversight and expertise are crucial when using robotic process automation and artificial intelligence. Innovative and inventive solutions are currently needed for many of the dangers facing auditing operations. The use of these technologies in auditing operations still depends on auditors having the proper training and expertise, as is the maintenance of manual systems. Given the substantial risks associated with auditing cutting-edge accounting systems, the audit objectives will likely fail to be met. Consequently, they risk coming under professional and perhaps legal scrutiny for offering an incorrect opinion.

The use of RPA and AI intelligence technology increases reliability as robots operate 24 hours a day, 7 days a week effectively, reducing the amount of manual workload, thus contributing to the reduction of time and cost, which means reducing the time required to prepare reports and access information to external parties, thus protecting stakeholders in making their decisions promptly in addition to achieving audit quality. However, despite the great benefits of these technologies, auditors do not trust them. The absence of faith is the most oversized challenge facing the widespread adoption of these technologies and their tools, as this problem stems from the hardship of understanding the complex internal processes carried out by automation and artificial intelligence algorithms, which raises questions about their reliability and transparency.

This study addressed the challenges facing the external auditor due to the tremendous

technological developments in a rapidly developing world, especially concerning the automation of robotic processes and artificial intelligence in auditing to measure their impact in reducing audit risks. The Iraqi environment was the place to survey a sample of auditors in the Federal Board of Financial Supervision. The study also aimed to draw the attention of auditors to the challenges they will face as a result of technological development in accounting systems, especially about the automation of robotic processes and artificial intelligence, which requires them to develop their tools in the same direction to automate robotic processes and artificial intelligence for audit procedures to reduce the audit risks that auditors may be exposed to in light of these complex systems. According to the study's conclusions, using RPA and AI to reduce audit risks was found to have a substantial statistical link and evident impact. In addition, the study's findings suggest that these technologies can significantly improve the report's quality by mitigating inherent, control, and detection risks. The results of this study will contribute to future studies by more mature researchers, and their results will lead to the development of the auditing profession considering the development of modern intelligent systems.

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