Asian Journal of Economics, Business and Accounting

Volume 24, Issue 1, Page 32-45, 2024; Article no.AJEBA.110862
ISSN: 2456-639X

Challenges and Opportunities of Implementing Artificial Intelligence in Auditing Practices: A Case Study of Nigerian Accounting Firms

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJEBA/2024/v24i11210

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/110862

Original Research Article

Received: 22/10/2023
Accepted: 27/12/2023
Published: 04/01/2024

ABSTRACT

The ever-evolving nature of the worldwide business arena is undergoing a significant change propelled by technological progress, where artificial intelligence (AI) is emerging as a central force redefining conventional methodologies. This research intends to identify and dissect the challenges encountered by Nigerian accounting firms in incorporating AI into their auditing processes, and to illuminate the opportunities that arise from leveraging AI capabilities in the auditing domain. This research utilized a survey research design. A well-structured questionnaire was employed to gather data from statutory auditors familiar with the use of artificial intelligence within their accounting firms situated in Lagos, the commercial hub of the Nigerian economy. The study encompassed all 35 registered accounting firms in Lagos State, Nigeria, employing a census sampling technique to

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determine the sample size, representing 100% of the population. Given the relative size of the population, five respondents were chosen from each accounting firm, totaling 175 respondents. The study received 153 responses, constituting 87% of the sample size. Descriptive and inferential statistics were applied to analyze the collected data. The outcomes reveal that AI, encompassing machine learning, natural language processing, and expert systems, significantly contributes to identifying challenges and highlighting opportunities in this context. The results underscore the positive role of AI in addressing challenges and revealing potential advancements in auditing practices within Nigerian accounting firms. The study concludes that AI, particularly machine learning, holds promise for addressing challenges and fostering advancements in auditing practices for Nigerian accounting firms. Given the significant positive impact of machine learning, accounting firms in Nigeria should consider prioritizing the integration of machine learning technologies into their auditing practices.

Keywords: Artificial intelligence; machine learning; expert systems; natural language processing; auditing practices; Nigerian accounting firm.

1. INTRODUCTION

The ever-evolving nature of the worldwide business arena is undergoing a significant change propelled by technological progress, where artificial intelligence (AI) is emerging as a central force redefining conventional methodologies. In the realm of auditing, the integration of AI has introduced both challenges and opportunities that necessitate a nuanced understanding, particularly in the context of Nigerian accounting firms [1]. This article delves into the intricacies surrounding the adoption of AI in auditing practices within the Nigerian business environment, seeking to unravel the challenges faced by accounting firms while exploring the opportunities that this transformative technology presents [2].

Nigeria, as a vibrant economic hub in Africa, is not immune to the disruptive forces of technological innovation. As accounting firms in the country navigate the complexities of a rapidly evolving business landscape, the implementation of AI in auditing practices stands out as a focal point that demands scholarly scrutiny [3,4]. While the potential benefits of AI, such as enhanced efficiency, improved accuracy, and the ability to analyze vast datasets, are evident, the road to implementation is fraught with challenges unique to the Nigerian context.

This research intends to identify and dissect the challenges encountered by Nigerian accounting firms in incorporating AI into their auditing processes, and to illuminate the opportunities that arise from leveraging AI capabilities in the auditing domain. By employing a case study approach, we aim to contextualize these challenges and opportunities within the intricacies of the Nigerian business ecosystem, providing insights that can inform strategic decision-making and policy formulation. The study employs a comprehensive review of existing literature on AI in auditing, offering a theoretical foundation for understanding the intricacies of this transformative technology. Drawing from this theoretical framework, we delve into the empirical dimension by presenting findings from a case study conducted on select Nigerian accounting firms actively engaged in AI adoption in their auditing practices. This combination of theoretical insights and real-world case analysis seeks to contribute to both academic discourse and practical implications for accounting professionals, policymakers, and technology enthusiasts in Nigeria and beyond.

As we embark on this exploration of the challenges and opportunities inherent in implementing AI in auditing practices within Nigerian accounting firms, we anticipate uncovering valuable insights that will enrich our understanding of the evolving relationship between technology and audit processes. By doing so, we aim to equip stakeholders with the knowledge necessary to navigate this transformative landscape and harness the full potential of AI in enhancing auditing practices within the unique context of Nigeria.

2. LITERATURE REVIEW

This segment offers a summary of the current body of literature concerning the interplay of artificial intelligence with accounting functionalities. It underscores the theoretical underpinnings and empirical findings that substantiate the correlation between proficient

artificial intelligence utilization and the enhancement of quality in auditing practices.

2.1 Artificial Intelligence

Artificial Intelligence (AI) refers to the development of computer systems or software that can perform tasks that typically require human intelligence [5]. These tasks include learning from experience, adapting to new information, understanding natural language, recognizing patterns, solving problems, and making decisions [6]. AI systems are designed to simulate cognitive functions, enabling machines to execute complex tasks and exhibit behaviors traditionally associated with human intelligence. AI encompasses various subfields, such as machine learning, natural language processing, computer vision, and robotics, contributing to the creation of systems capable of perceiving, reasoning, and learning from data [7,1].

In the context of audit practices, Artificial Intelligence (AI) refers to the application of advanced computational technologies that simulate human-like intelligence to enhance various aspects of the audit process [8]. AI in auditing involves the development and deployment of computer systems capable of performing tasks traditionally carried out by auditors, to improve efficiency, accuracy, and the overall effectiveness of audit procedures. This may include the use of machine learning algorithms, natural language processing, and data analytics to analyze large volumes of financial data, identify patterns, detect anomalies, and provide insights that contribute to more informed decision-making in the audit domain. The integration of AI technologies in audit practices aims to streamline processes, reduce manual efforts, and enhance the ability to uncover insights from complex datasets, ultimately improving the quality and thoroughness of audits [5,9].

2.1.1 Machine learning

Machine Learning (ML) in the context of audit practices refers to the application of advanced computational algorithms and statistical models that enable computer systems to learn from data and improve their performance over time without being explicitly programmed [6]. ML enhances audit processes by automating data analysis, identifying patterns, and making predictions, thereby aiding auditors in gaining valuable insights and improving the efficiency and effectiveness of their work. ML algorithms can analyze large volumes of audit data, including financial statements, transactions, and other relevant information [3]. By recognizing patterns and trends within the data, ML helps auditors identify anomalies, potential risks, and areas that require further scrutiny. ML enables auditors to use historical data to make predictions about future events or outcomes. This is particularly useful in forecasting financial trends, identifying potential fraud, or predicting areas of the audit that may require additional attention. ML can automate routine and repetitive audit tasks, such as data entry, validation, and reconciliation. By automating these processes, auditors can focus on more complex and analytical aspects of the audit, improving overall productivity [7].

ML algorithms can be trained to detect patterns associated with fraudulent activities. This helps auditors in identifying irregularities in financial transactions or behaviors that may indicate fraudulent activities, enhancing the ability to mitigate risks [10]. ML models can assist auditors in assessing risks by analyzing historical data and identifying factors that contribute to potential risks. This allows auditors to allocate resources more effectively and prioritize areas of the audit where risks are higher. ML facilitates continuous monitoring of financial data in real-time [11]. This proactive approach allows auditors to promptly detect and address issues, ensuring that audit processes are aligned with the current state of the organization's financial activities. By leveraging ML in audit practices, auditors can enhance their analytical capabilities, improve risk assessment, and increase the overall effectiveness of the audit process. The technology complements traditional audit methods, providing auditors with powerful tools to navigate the complexities of financial data and contribute to more robust and insightful audit outcomes [11].

2.1.2 Natural language processing

Natural Language Processing (NLP) in the context of audit refers to the application of advanced computational techniques to enable computer systems to understand, interpret, and generate human language. NLP plays a crucial role in enhancing the efficiency and effectiveness of audit practices by allowing auditors to analyze, extract insights, and make sense of unstructured textual data commonly found in financial documents, reports, contracts, and other relevant materials. NLP enables the analysis of large

volumes of unstructured text data. In audit, this can involve processing financial statements, legal agreements, and other textual documents to extract relevant information and identify key insights [12]. NLP algorithms can parse through complex documents, extracting specific data points, and categorizing information. This capability aids auditors in automating the extraction of relevant details from documents, saving time and reducing the risk of errors associated with manual data entry. NLP allows auditors to gauge the sentiment expressed in textual content [10]. This can be particularly useful in assessing the tone of financial reports, disclosures, or communications from company executives, providing additional context to auditors. NLP enables computers to understand the meaning and context of human language. In audit, this can involve interpreting nuanced language in contracts, agreements, or financial statements, ensuring a comprehensive understanding of the information [11].

NLP can assist in extracting structured data from unstructured text. For example, it can identify and extract numerical values, dates, or other relevant information from financial documents, contributing to the analysis of financial data. NLP can be applied to automate the generation of reports and summaries. Auditors can leverage this capability to create concise and insightful summaries of audit findings, facilitating communication with stakeholders [13]. NLP algorithms can aid in identifying language patterns associated with fraudulent activities. By analyzing textual data, auditors can uncover irregularities, potentially fraudulent transactions, or discrepancies that may require further investigation. NLP helps auditors stay abreast of regulatory requirements by analyzing and interpreting legal and compliance documents. This ensures that audit processes align with relevant regulations and standards. By integrating NLP into audit practices, auditors can harness the power of language understanding and automated text analysis. This not only improves the speed and accuracy of audit procedures but also enhances auditors' ability to derive meaningful insights from the wealth of unstructured textual information associated with financial reporting and regulatory compliance (Noordin et al., 2022).

2.1.3 Expert systems

Expert Systems in the context of audit refer to computer-based applications that mimic the decision-making abilities of human experts in a specific domain. These systems are designed to emulate the knowledge, reasoning processes, and problem-solving skills of experienced auditors. In the field of audit, expert systems are utilized to provide guidance, make decisions, and offer solutions to complex problems based on a predefined set of rules, algorithms, and knowledge [5]. Expert systems in audit have a comprehensive knowledge base that contains explicit information, rules, and heuristics derived from the expertise of seasoned auditors. This knowledge encompasses audit standards, regulatory requirements, industry best practices, and specific organizational policies. The inference engine is the core component that processes information and applies logical reasoning to arrive at conclusions or make recommendations [3]. In audit expert systems, the inference engine uses the rules and knowledge from the knowledge base to draw inferences and make audi t-related decisions. Expert systems provide decision support to auditors by offering insights into complex audit issues. This may include guidance on risk assessment, materiality considerations, compliance checks, and the identification of potential audit risks [1].

Expert systems assist auditors in problem-solving by analyzing audit data, identifying anomalies or deviations from established norms, and suggesting appropriate courses of action. This can enhance the efficiency and effectiveness of audit processes. Expert systems ensure consistency in decision-making across different audit engagements. By following predefined rules and standards, these systems help maintain uniformity in audit practices and align with organizational or regulatory requirements [7,14]. Some expert systems have the capacity to learn from experience, allowing them to adapt and improve over time. This learning capability can be valuable in enhancing the system's knowledge base and decision-making effectiveness in response to changing audit landscapes. Expert systems ensure that audit processes comply with relevant regulations and standards. By incorporating up-to-date regulatory requirements into their knowledge base, these systems assist auditors in conducting audits that align with legal and industry standards. While expert systems in audit can significantly enhance decision-making and efficiency, they are most effective when used in conjunction with the judgment and expertise of human auditors. The collaboration between

expert systems and auditors creates a synergistic approach, leveraging the strengths of both to optimize the audit process [12].

2.2 Auditing Practices

Audit practice refers to the systematic process of examining and evaluating financial information, systems, processes, and controls within an organization. The primary objective of audit practice is to provide an independent and objective assessment of an entity's financial statements, ensuring their accuracy, reliability, and compliance with applicable accounting standards and regulatory requirements [3,15]. Audit practices are conducted by qualified professionals known as auditors, who follow established methodologies and standards to assess an organization's financial health, internal controls, and overall governance. The core focus of audit practice is the examination of an organization's financial statements, including the balance sheet, income statement, and cash flow statement. Auditors verify the accuracy and completeness of financial data, ensuring that it fairly represents the entity's financial position and performance. Auditors assess the effectiveness of an organization's internal controls, policies, and procedures [5]. This includes evaluating the design and implementation of controls to prevent and detect errors, fraud, and other irregularities. Audit practice includes a review of an organization's adherence to relevant laws, regulations, and industry standards. Auditors verify that the entity is in compliance with legal and regulatory requirements governing financial reporting and other aspects of business operations [1].

Auditors conduct risk assessments to identify and evaluate potential risks that may impact the accuracy and reliability of financial statements. This involves understanding the entity's business environment, industry risks, and internal control environment. Before conducting an audit, auditors develop an audit plan outlining the scope, objectives, and procedures for the audit engagement. Planning ensures that the audit is conducted efficiently and effectively. At the conclusion of the audit, auditors express an opinion on the fairness and reliability of the financial statements [16]. The audit opinion may be unqualified (clean), qualified, adverse, or a disclaimer, depending on the findings and compliance with accounting principles. Audit practice emphasizes continuous improvement by incorporating feedback from audits, staying current with changes in regulations and accounting standards, and adopting best practices to enhance the effectiveness of future audits. Overall, audit practice plays a vital role in promoting transparency, accountability, and trust in financial reporting. It serves as a critical mechanism for ensuring the integrity of financial information and fostering confidence among stakeholders, including investors, regulators, and the broader public [17,7].

2.3 Theoretical Framework

This study is anchored in agency theory, a fundamental concept in auditing that elucidates the relationship between managers and investors. Originating independently and approximately simultaneously by Stephen Ross and Barry Mitnick in 1973, the theory posits the manager as the agent representing the investors as the principal [18]. While the ideal scenario entails the manager acting in the best interest of the investors, there are instances where the agent may not prioritize the principal's interests. Consequently, auditing assumes a crucial role in assuring investors that managers fulfill their obligation to represent investor interests. Auditors bear the responsibility of guiding investors and overseeing managerial actions. Audit reports aid investors in making well-informed decisions regarding the purchase, sale, or retention of securities. The escalating size of companies corresponds to an increase in the volume of data requiring auditing. Therefore, auditors must furnish investors with timely and reliable information, ensuring their adherence to reliability standards through thorough examinations of financial reports [5,3,19].

2.4 Empirical Review

Numerous investigations have explored the influence of artificial intelligence (AI) on accounting and auditing procedures. In a recent study by Dagunduro et al. [5], the research delved into the ramifications of AI on the quality of audit practices within the Nigerian context. Employing a survey research design, the study engaged 178 active accounting firms in Nigeria utilizing AI applications. A purposive sampling method determined a sample size of 125, and primary data were gathered through a meticulously crafted questionnaire. Descriptive statistics and Ordinary Least Squares (OLS) were employed for data analysis. Results revealed a substantial positive correlation between expert systems, machine learning,

intelligent agents, and audit quality in Nigeria. Similarly, Falana et al. [20] undertook an investigation to evaluate the impact of big data on the quality of accounting information in selected Nigerian firms. Data for the study were collected through well-structured questionnaires from a primary source, targeting a population of 157 firms listed on the Nigeria Exchange Group as of December 31, 2021. Utilizing purposive sampling, a sample size of 20 firms was selected. Regression analysis was applied for data analysis, uncovering a significant positive impact of data volume, data variety, and data velocity on the quality of accounting information.

Awotomilusi et al. [21] identified a noteworthy positive correlation between cloud computing and accounting procedures within the Nigerian context. Odoh et al. (2018) ascertained that artificial intelligence has a favorable impact on enhancing the performance of accountants in their responsibilities. Monal et al. [22] predicted that the adoption of AI is poised to usher in a new era marked by creativity and innovation, thereby propelling advancements in the fields of accounting and auditing. Additional research has consistently reported significant positive influences of AI on both accounting and auditing practices. In a review conducted by Almufadda and Almezeini [23] on the impact of AI applications on the auditing profession, it was noted that the integration of AI into audit practices remains predominantly limited to the Big 4 accounting firms. In summation, these collective findings suggest that the incorporation of cloud computing and AI has the potential to enhance and refine accounting and auditing practices.

Hasan [24] conducted a comprehensive assessment of the application of Artificial Intelligence (AI) in Accounting and Auditing. Utilizing a semi-systematic or narrative review methodology, the study scrutinized published literature in books and journals within the field. The results underscored the imperative for the accounting and auditing discipline to undergo a transformation in response to the challenges posed by disruptive technologies in the economic sector. The study emphasized the significance of interdisciplinary collaboration in AI-related research within accounting and auditing, predicting that broader AI adoption in these professions would yield advantages such as heightened efficiency, productivity, and accuracy.

Owonifari et al. [3] examined the consequences of integrating artificial intelligence and machine learning technologies into accounting functions within business organizations. The study employed a survey questionnaire and qualitative literature review to collect data. The outcomes suggested that while AI technology may supplant routine accounting tasks, it simultaneously creates novel opportunities for accounting professionals to assume more strategic and gratifying roles beyond traditional bookkeeping. However, concerning Nigerian companies specifically, the study determined that the regression model lacked significance, indicating no statistically significant relationship between AI and accounting functions in these companies.

Akinadewo [7] delved into the correlation between Artificial Intelligence (AI) and accountants' approaches to accounting functions. Employing a structured questionnaire with a sample size of 205 experienced accountants in systems application for accounting and financial transactions functions, the research revealed a noteworthy positive impact of artificial intelligence on how accountants approach their accounting functions. Conversely,

Sharma et al. [25] directed their focus on scrutinizing the perception and acceptance of artificial intelligence technology in accounting within accounting professionals and other stakeholders. Data, collected through structured questionnaires from accounting professionals, businessmen, educators, and students, underwent analysis using partial least square structural equation modeling. The study disclosed that factors such as insecurity, attitude toward use, and perceived ease of use exert a moderate influence on the intention to use artificial intelligence in accounting. Additionally, it highlighted that while artificial intelligence is regarded as the future of accounting, concerns about privacy and security persist as significant issues of apprehension.

Hashem and Alqatamin [26] investigated the influence of artificial intelligence (AI) on Accounting Information Systems (AIS) and non-financial performance standards. Using a quantitative approach, they distributed electronic questionnaires to 409 managers, department heads, and accountants in industrial establishments in Jordan during the fiscal year 2020/2021. Qualitative findings underscored the significance of AI in fraud detection and risk prevention. Challenges included regulatory requirements, data privacy concerns, security

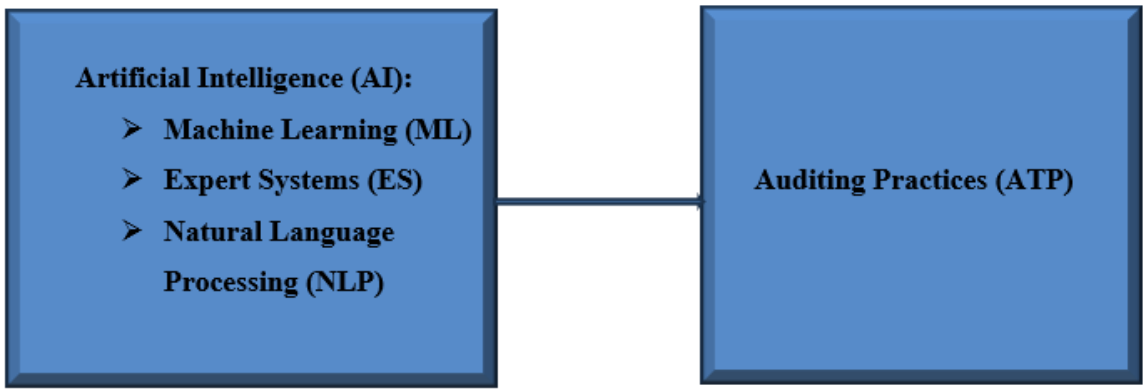

Fig. 1. Interaction between artificial intelligence and audit practices
Source: Authors' Concept (2023)

issues, and a lack of relevant skills and IT infrastructure. Quantitative results revealed that attitudes towards AI, perceived usefulness, perceived risk, perceived trust, and subjective norms significantly impacted the intention to adopt AI in banking services. Attitudes towards AI mediated the relationship between perceived usefulness and AI adoption intention.

Abdul & Eitedal [27] investigated the impact of AI on the accounting and auditing profession, particularly in the context of the COVID-19 pandemic. Questionnaires distributed to accountants and auditors in the Gaza Strip indicated a significant positive impact of AI on professional performance, efficiency, and system development in accounting and auditing, especially during the pandemic. Ezenwa [16] explored the opportunities, challenges, and applications of AI in banking, accounting, and auditing in Nigeria. Using both qualitative and quantitative methods, their research revealed the potential roles of AI in the future of banking and auditing systems.

The literature review revealed a shortage of research in Nigeria examining the relationship between AI and the quality of audit practices. Additionally, current studies primarily focus on the big four accounting firms, overlooking practitioners in small and medium-sized audit firms. This study aims to address these notable gaps by investigating the influence of artificial intelligence on audit practices within Nigerian accounting firms. Consequently, the research hypothesis is framed as follows:

Ho_1: Artificial intelligence does not have significant effect on audit practices.

2.5 Conceptual Framework

Fig. 1 shows the interaction between artificial intelligence (independent variable) and audit practices (dependent variable).

3. METHODOLOGY

To identify and analyze the challenges faced by accounting firms in Nigeria when integrating artificial intelligence (AI) into their audit processes and to shed light on the opportunities arising from harnessing AI capabilities in the audit domain, this research utilized a survey research design. A well-structured questionnaire was employed to gather data from statutory auditors familiar with the use of artificial intelligence within their accounting firms situated in Lagos, the commercial hub of the Nigerian economy. The study encompassed all 35 registered accounting firms in Lagos State, Nigeria, employing a census sampling technique to determine the sample size, representing 100% of the population. Given the relative size of the population, five respondents were chosen from each accounting firm, totaling 175 respondents. The study received 153 responses, constituting 87% of the sample size. Descriptive and inferential statistics were applied to analyze the collected data.

3.1 Reliability Test

As presented in Table 1, the Cronbach Alpha values for the various dimensions explored in this study serve as reliable indicators of the internal consistency of the scale items. The dimension associated with Machine Learning (ML) demonstrated strong internal consistency, registering a Cronbach Alpha of 0.845,

Table 1. Reliability test results

S/N	Variable	No. of Items	Cronbach's Alpha
1	Machine Learning (ML)	5	0.845
2	Natural Language Processing (NLP)	5	0.747
3	Expert Systems (ES)	5	0.769
4	Auditing Practices (ATP)	5	0.810

Source: Author's Computation (2023)

encompassing a set of 5 items. Similarly, the dimension related to Natural Language Processing (NLP) exhibited a Cronbach Alpha of 0.747 across 5 items. The dimension linked to Expert Systems (ES) achieved solid internal consistency, with a Cronbach Alpha of 0.769, based on 5 items. Additionally, the dimension concerning Auditing Practices (ATP) demonstrated robust internal consistency, with a Cronbach Alpha of 0.792, covering 5 items. These findings confirm the strong internal consistency of all scale items, with Cronbach Alpha values exceeding the 0.7 threshold.

4. RESULTS AND ANALYSIS

This segment unveils the outcomes of the research, emphasizing the obstacles encountered by Nigerian accounting firms as they incorporate artificial intelligence (AI) into their audit procedures and elucidating the potential opportunities stemming from the utilization of AI capabilities in the audit realm.

4.1 Descriptive Statistics

Table 2 provides a comprehensive overview of the descriptive statistics for the variables investigated in this study, namely Machine Learning (ML), Natural Language Processing (NLP), Expert Systems (ES), and Auditing Practices (ATP). The minimum and maximum values for these variables range from 1 to 5, indicating the spread of responses within this 5-point scale. The average values for these variables offer insights into the central tendency of responses. On average, respondents rated ML at 4.7320, NLP at 4.7974, ES at 4.7843, and ATP at 4.6928. These averages suggest that, on average, respondents perceived these dimensions to be rated relatively high on the 5-point scale.

The Standard Deviation values indicate the degree of variability or dispersion in the responses. For ML, the Standard Deviation was 0.65901, for NLP it was 0.77255, for ES it was 0.82670, and for ATP, it was 0.72802. Higher Standard Deviation values suggest greater variability in responses. Variance Statistic values reflect the extent of dispersion or variability in the dataset. For ML, the Variance Statistic was 0.434, for NLP it was 0.597, for ES it was 0.683, and for ATP, it was 0.530. Higher variance values indicate increased variability in the dataset.

Skewness Statistic values provide insights into the symmetry of the data distribution. Negative skewness values for ML, NLP, ES, and ATP (-3.843, -3.623, -3.684, and -3.599 respectively) suggest that the data is skewed to the left, with the tail on the left side of the distribution being longer or fatter. Kurtosis Statistic values reflect the peakedness or flatness of the data distribution. Higher kurtosis values indicate a more peaked distribution. In this case, ML exhibits a kurtosis value of 18.381, NLP has a kurtosis value of 11.528, ES has a kurtosis value of 12.124, and ATP shows a kurtosis value of 15.262.

4.2 Correlation Analysis

Table 3 displays the Pearson correlations matrix, elucidating the connections among the independent variables. The objective of this correlation analysis was to explore the relationships between the variables under scrutiny. The outcomes within the correlation matrix reveal a mild positive correlation of 0.448 between Machine Learning (ML) and Natural Language Processing (NLP). Concerning the relationship between Expert Systems (ES) and Machine Learning (ML), there exists a perfect yet positive correlation of 0.726, while the correlation between Natural Language Processing (NLP) and Expert Systems (ES) indicates a slight positive correlation of 0.467. These results imply that an increase in one variable aligns with an increase in another. It is noteworthy to emphasize that the observed level of correlation does not surpass a threshold that would lead to significant collinearity issues, potentially distorting the accuracy of coefficient standard errors.

Table 2. Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
ML	153	1.00	5.00	4.7320	.65901	.434	-3.843	.196	18.381	.390
NLP	153	1.00	5.00	4.7974	.77255	.597	-3.623	.196	11.528	.390
ES	153	1.00	5.00	4.7843	.82670	.683	-3.684	.196	12.124	.390
ATP	153	1.00	5.00	4.6928	.72802	.530	-3.599	.196	15.262	.390
Valid N (listwise)	153									

Source: Author's Computation (2023)

Table 3. Correlations analysis

		Machine Learning (ML)	Natural Language Processing (NLP)	Expert Systems (ES)
Machine Learning (ML)	Pearson Correlation	1	.448**	.726**
	Sig. (2-tailed)		.000	.000
	N	153	153	153
Natural Language Processing (NLP)	Pearson Correlation	.448**	1	.467**
	Sig. (2-tailed)	.000		.000
	N	153	153	153
Expert Systems (ES)	Pearson Correlation	.726**	.467**	1
	Sig. (2-tailed)	.000	.000	
	N	153	153	153

***. Correlation is significant at the 0.01 level (2-tailed)*
Source: Author's Computation (2023)

4.2.1 Multicollinearity test

The study conducted a Variance Inflation Factor (VIF) evaluation to gauge the extent of multicollinearity among the variables investigated. This analysis aimed to review the level of correlation among the independent variables within the context of a multiple regression analysis. VIF measures how much the variance of a coefficient estimate is inflated due to the linear interdependence among the independent variables incorporated into the model. The VIF results, outlined in Table 4, reveal that the VIF values for all independent variables are relatively moderate. The highest VIF value is attributed to the Expert Systems (ES) variable, standing at 2.235, a value comfortably below the critical threshold of 10. This observation indicates the absence of noteworthy multicollinearity within the model, thereby enhancing the reliability and stability of the coefficients. This outcome is consistent with the findings of the correlation analysis.

4.3 Regression Analysis of the Effect of Artificial Intelligence on the Auditing Practices

The outcomes of the regression analysis aim to identify and analyze the challenges faced by Nigerian accounting firms in integrating AI into their auditing processes, as well as to shed light on the opportunities arising from harnessing AI capabilities in the auditing domain. These results are outlined in Tables 5 and 6. Table 5 reveals a coefficient of determination (R2) of 0.780, with an adjusted R2 of 0.776. This suggests that approximately 78% of the variability in Auditing Practices (ATP) can be collectively explained by Artificial Intelligence (AI), considering adjustments for model complexity. The F-statistics value of 176.107, along with a probability value of 0.000 (statistically significant at 5%), confirms the overall significance of the model. This indicates that Artificial Intelligence (AI), including machine learning, natural language processing, and expert systems, effectively predicts auditing practices in these firms, with the remaining 28% accounting for factors not considered in this study's model.

In Table 6, the statistical significance of each parameter related to the impact of artificial intelligence on auditing practices is elaborated. The positive coefficient of 0.393 units, with a probability value of 0.000, signifies a constant effect on auditing practices. Furthermore, Machine Learning (ML) demonstrates a statistically significant positive coefficient of 15.514, indicating that a one-unit increase in machine learning results in a substantial 15.514-unit increase in auditing practices. This relationship is supported by a probability value of 0.000. Conversely, Natural Language Processing (NLP) shows a statistically insignificant and negative coefficient of -0.146, suggesting that a one-unit increase in natural language processing leads to a -0.146-unit decrease in auditing practices, with a probability value of 0.884. Lastly, Expert Systems (ES) displays a statistically insignificant positive coefficient of 0.103, indicating that a one-unit increase in expert systems corresponds to a 2.584-unit increase in auditing practices, with a probability value of 0.918.

Table 4. Multicollinearity test

Model		Collinearity Statistics	
		Tolerance	VIF
1	Machine Learning (ML)	.457	2.188
	Natural Language Processing (NLP)	.757	1.321
	Expert Systems (ES)	.447	2.235
a. Dependent Variable: Auditing Practices (ATP)			

Source: Author's Computation (2023)

Table 5. Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.883[a]	.780	.776	.34488

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	62.840	3	20.947	176.107	.000[b]
	Residual	17.722	149	.119		
	Total	80.562	152			

a. Dependent Variable: Auditing Practices (ATP)

b. Predictors: (Constant), Expert Systems (ES), Natural Language Processing (NLP), Machine Learning (ML)

Source: Author's Computation (2023)

Table 6. Coefficients correlation analysis

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	**Std. Error**	**Beta**		
1	(Constant)	.088	.223		.393	.695
	Machine Learning (ML)	.974	.063	.882	15.514	.000
	Natural Language Processing (NLP)	-.006	.042	-.006	-.146	.884
	Expert Systems (ES)	.005	.051	.006	.103	.918

a. Dependent Variable: Auditing Practices (ATP)

Source: Author's Computation (2023)

4.4 Discussion of Findings

The regression analysis aimed to uncover challenges and opportunities arising from the integration of artificial intelligence (AI) into auditing processes for Nigerian accounting firms. The outcomes reveal that AI, encompassing machine learning, natural language processing, and expert systems, significantly contributes to identifying challenges and highlighting opportunities in this context. The results underscore the positive role of AI in addressing challenges and revealing potential advancements in auditing practices within Nigerian accounting firms. Individual parameters related to AI's roles in auditing practices were investigated. Machine learning demonstrated a significant and positive impact, indicating that its utilization is associated with favorable outcomes and improvements in auditing processes.

Conversely, natural language processing did not significantly enhance auditing practices, implying limited positive effects within the study's scope. Lastly, expert systems exhibited a statistically insignificant yet positive impact, suggesting that their use did not yield noteworthy improvements that could be considered statistically significant. The lack of statistical significance indicates that the observed effects may not be reliably attributed to expert systems in the auditing domain based on the study's data [28].

5. CONCLUSION AND RECOMMENDATION

This study employed regression analysis to explore the challenges and opportunities arising from the integration of artificial intelligence (AI) into auditing processes within Nigerian

accounting firms. The findings indicate that AI, including machine learning, natural language processing (NLP), and expert systems, plays a significant role in identifying challenges and highlighting opportunities in this context. The study focuses on individual AI parameters, revealing that machine learning has a substantial and positive impact on improving auditing practices. However, NLP's influence is limited, and expert systems, while showing a positive trend, lack statistical significance. The study concludes that AI, particularly machine learning, holds promise for addressing challenges and fostering advancements in auditing practices for Nigerian accounting firms. While machine learning demonstrates a significant positive impact, the limited effects of NLP and the lack of statistical significance for expert systems suggest nuances in their contributions. The findings underscore the complexity of AI integration and highlight the need for a nuanced approach when incorporating specific AI components into auditing processes.

Based on the study's findings, the following recommendations are proposed:

i. Given the significant positive impact of machine learning, accounting firms in Nigeria should consider prioritizing the integration of machine learning technologies into their auditing practices.
ii. Although natural language processing showed limited positive effects in this study, further research and experimentation are recommended to explore its potential benefits when integrated into auditing processes. Understanding the specific contexts where NLP can be most effective is crucial.
iii. Accounting firms should approach the implementation of expert systems in auditing practices with caution, considering the lack of statistical significance in this study. Further research and evaluation of expert systems' effectiveness in specific auditing contexts are recommended before widespread adoption.

CONTRIBUTIONS TO KNOWLEDGE

This study contributes to the knowledge by providing insights into the nuanced impact of different AI components on auditing practices in Nigerian accounting firms. The findings contribute to a more nuanced understanding of the challenges and opportunities associated with AI integration in auditing and provide valuable guidance for practitioners and researchers in the field.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/110862