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How Can Implementing Artificial Neural Networks Enhance the Quality of Internal Audits?

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Abstract. Considering the increasing dependence on artificial intelligence in various fields, including accountability and scrutiny in a wide range, the need to develop internal audit work in economic units has shown by resorting to artificial intelligence applications, and accordingly, this study aims to know the impact of adoption of artificial neurological networks (ANN) in enhancing the level of internal audit quality in Iraqi banks, and to achieve the research goal that has developed a questionnaire of a questionnaire for this The purpose and consisting of pivotal, the first includes 11 paragraphs to measure the role and importance of artificial nervous networks, while the second consists of 12 paragraphs to measure the reality of internal audit in light of the information technology, 417 questionnaires were distributed to auditors and accountants in Iraqi banks listed in the 46 Banks, Data analysis used the descriptive, and factor analysis to ensure the sincerity and stability of the question naive, and as well as the simple linear regression to prove the hypotheses. The findings indicated a negligible correlation of 5.5% between artificial neural networks and the quality of internal auditing, with a significance level of 0.133, much over the permissible threshold of 5% in social sciences. Moreover, utilising neural networks does not compromise the quality of internal auditing.

Keywords. Artificial Neural Networks; Quality of Internal Audits; AI

Introduction

Auditors must evaluate the operation inside novel contexts, such as information systems utilizing artificial neural networks (ANNs), as a potential solution and support mechanism for their activities (Koskivaara, 2003). Neural networks are an audit facilitator to mitigate risks (Thomas & Cheh, 2022). The digitization of business operations presents a novel problem in internal auditing, compelling auditors to identify equitable solutions to enhance their efficacy. Using artificial neural networks in internal auditing solves these problems: tasks are completed much faster, data is analysed quickly and accurately, errors are caught early, and appropriate remedies are identified (Ali et al., 2022). This technology is regarded as advanced and holds potential as an enabler of risk-based solutions by applying neural networks (NNs) to enhance the quality and efficiency of audits by automating tasks like fraud detection and anomaly identification. Moreover, internal auditors must thoroughly understand artificial

intelligence, including its risks and opportunities. Crucial for the efficacy of audit activities (Anomah et al., 2024).

Mitan (2024) asserts that applying machine learning and deep learning in data processing will transform internal auditing. These technologies will expedite jobs, enhance data analysis, assist in risk assessment and fraud detection, and optimize processes to conserve time. Ultimately, auditors will enhance their capacity for analytical and decision-making functions. Arinola and Akinrinola (2023) argue that internal auditors play an important role in the wise and successful management of organizational risks. One way to accomplish this is to use artificial intelligence techniques, notably neural networks. Internal audit specialists must continually adjust to this transformation (Nicolau, 2023) as human expertise and neural networks collaborate to enhance auditing precision and efficacy. It is important to realize the problems connected with deploying new technologies, such as insufficient expertise and experience, elevated costs, and concerns around data security. Consequently, substantial results, especially concerning IT infrastructure and its impact on audit quality, need cooperation between public and private sector entities (Merkhoufi et al., 2024).

Using a sample of auditors and accountants from banks listed on the Iraq Stock Exchange, the study seeks to determine how artificial neural networks affect the calibre of internal auditing. This is achieved by identifying artificial neural networks and showcasing internal auditors' ability to work together and advance neural networks and other artificial intelligence systems. The study's conclusions can be extended to audit departments in other public sector enterprises and will be helpful to audit departments in Iraqi banks.

Literature review

2.1 Artificial Neural Networks is a Tool for Successful Internal Auditing.

The way individual artificial neurons connect is called the topology, structure, or graph of an artificial neural network. Therefore, it is an effort to mathematically model the configuration and function of neural networks in biological entities. The primary component of any artificial neural network is an artificial neuron. An artificial neuron constitutes the fundamental component of all artificial neural networks (Moghaddam et al., 2016). It is a complex network or interconnected system containing multiple processing units, like the human brain. It is designed to perform complex operations using these processing units, such as finding the relationship between variables for nonlinear functions. Neural networks are one of the techniques used in artificial intelligence (AI). Artificial neural networks (ANNs) are computer simulations of the human brain and its interconnections (Banerjee & Singh, 2019). They are a subfield of AI that assists businesses in conserving time, effort, and financial resources by gathering, consolidating, and integrating data from several sources. Artificial neural networks enable the retrieval and access of digital assets. (Gusai, 2019).

In the era of big digital data, traditional auditing methods face challenges such as limited audit scope, uneven distribution of powers, and the inability to perform in-depth analysis to achieve high quality. Therefore, the use of modern technology in financial auditing is a new trend in this field (Hao and Wang). With the increasing complexity of business in the digital environment and technological development, internal auditors must realize the importance of understanding artificial intelligence tools (AI). Considering massive amounts of structured and unstructured data, understanding a company's financial and non-financial performance has become problematic. AI helps provide services such as fraud detection, improving internal operations, and enhancing the accuracy and efficiency of the audit process (Noordin et al., 2022). Therefore, there is a trend in all sectors to quickly engage with artificial neural networks

and artificial intelligence in internal auditing to facilitate internal auditing, considering the automation of corporate activities (Shivram, 2024). The purpose of applying AI and its tools, such as neural networks, to the organization's intelligent audit is to improve auditing efficiency and supervise and manage revenues and expenses in a timely and accurate manner. (Ding, 2022), in addition to identifying audit risks to maintain financial transparency and detect fraud instead of focusing only on risk assessment, in this context, there is an increasing demand for audits (Di, 2025)

2.2 Quality of Internal Audit

Technological advancements have facilitated the integration of information technology across various sectors, providing a competitive advantage for certain companies that sets them apart from their peers. Nonetheless, the methods of data processing, whether manual or electronic and the scope of auditing remain unchanged concerning electronic data processing. Nonetheless, the approaches to auditing and evidence collection may vary significantly. The observed difference may result from varying procedures in collecting, classifying, and storing accounting information (Alqudah et al., 2023). Internal auditing is a valuable management tool that allows for a sweeping evaluation of the organization and the execution of modifications to improve performance. This is crucial when it comes to corporate governance. It is an essential part of running a company. Studies on internal audit quality have concentrated on the internal audit department's independence, the internal auditors' competence, and the application of professional care. Artificial intelligence and neural networks currently have unreasonable influence. (Bechev et al., 2014); Samagaio & Felício, 2023). Some internal auditors assert that there is no distinction in the efficiency and effectiveness of internal auditing between modern and traditional methods (Marc et al., 2022).

Given the few factors that may be used to quantify audit quality, the difficulty in defining its scope, and the diversity of stakeholders involved, the concept of audit quality feels relative. Instead of concentrating on the audit's outcomes, auditors ensure everything is done according to plan and professional standards. To that end, businesses work hard to enhance their auditing procedures so all parties can feel safe (Muqramant, 2021). Finding out how stakeholders and auditors rate the quality of internal audits is crucial. The internal auditor's skill and independence in the internal audit function are the main factors that external auditors consider when evaluating the quality of internal audits. According to the IIA (Jokar & Daneshi, 2020), quality aligns with the standards and best practices that the IIA promotes. Depending on how management views the usefulness of internal audit reports, audit committee members and internal auditors work together to create a quality framework for internal audits. A well-executed internal audit will check for legal and regulatory compliance, evaluate the efficiency of internal controls, and take part in risk management. Thus, a system is deemed highly efficient once an internal audit can evaluate the efficacy of internal controls and take part in risk management (Kaawaase et al., 2021). This implies that the auditor is technically competent enough to identify serious mistakes made throughout the audit. Simultaneously, the auditor's report must rectify or identify significant mistakes or issues; independence guarantees this. Having competent and impartial internal auditors, however, improves the quality of internal audits (El Gharbaoui & Chraibi, 2021). Two parts to these components are crucial to the functioning of internal auditing bodies: first, the norms for professional behaviour in the field, which the standards make clear is essential, and second, the requirements for internal auditing practice (Wahhab & Khlaif, 2022). Within this framework, internal auditors can better use AI applications like artificial neural networks and machine learning algorithms to enhance the

speed and accuracy of their work, better detect risks, and make the internal audit function more efficient and adaptable. found that artificial neural networks help handle data better and with higher quality (Elem et al., 2024)

Research Method

3.1 Study Tool Description

We utilized a descriptive strategy to analyse the relevant literature and answer our study questions. We found a real problem with the internal audit function in Iraqi banks due to technological progress, which meant that we accomplished our study objectives and answered our research questions. To further validate the study's hypotheses, data was analysed using the SPSS program, which is part of the analytical technique. To that end, we devised a 23-question questionnaire that split the questions evenly between the two variables. All 46 commercial and Islamic banks listed on the Iraq Stock Exchange had their accountants and internal auditors chosen for the study. A total of 417 people were chosen at random. Factor analysis was a statistical procedure used for demographic data to prove the questionnaire's validity and reliability. Basic linear regression was employed to validate its hypothesis further, and the half-split approach was employed to determine the correlation between the study variables.

Study Aim and Objectives

Find out what artificial neural networks are, how they work, their features, what kinds of networks they fall under, and how they relate to computerized internal auditing. The report's secondary objective is to catalogue the ineffectiveness and inefficiency of Iraqi financial institutions' internal audit functions. To prove that internal auditors can successfully operate and advance in the context of AI applications, such as AI-powered neural networks, it was essential to quantify the connection and influence between AI-powered networks and the standard of internal auditing.

Problems and hypotheses of the study

Writers, academics, entrepreneurs, administrators, accountants, and others from various professions have been interested in AI applications. This is because they play a crucial role in making it possible to do numerous things much more quickly and accurately than a typical person could. Depending on the situation, there are a wide variety of uses. Artificial neural networks (ANNs) are one such use; they are mathematical models that mimic how the brain processes data. Artificial neural networks (ANNs) can enhance the quality of internal audits and carry out many other tasks that financial institutions and industries need. Therefore, Iraqi banks need to rely on ANNs to improve the quality of internal auditing, considering the sophisticated technological environment. To that end, we pose the following question: "Does the use of ANNs affect the quality of internal flow?" We can ask further questions based on the first one:

(a) Null hypothesis H0: Artificial neural networks (ANNs) do not improve the quality of internal audits.

(b) Existence hypothesis H1: Artificial neural networks (ANNs) are significantly related to higher-quality internal audits

Results

Findings from the factor analysis demonstrated that all survey questions were reasonably associated with the independent variable (artificial neural networks), with affiliation

percentages varying from 53.2% for question 12 to 73.5% for question 9. At the same time, all items belonged to the dependent variable (internal audit quality), according to the study. The affiliation percentage varied from 51.5% for question 13 to 77.4% for question 20. The reliability analysis of the scale using the half-split method revealed that the independent variable, consisting of 6 individual questions, and the independent variable, consisting of 6 even questions, both have reliability rates near to 1, with 78.7 per cent and 78.5 per cent, respectively. In addition, the results demonstrated that the dependent variable (Quality of Internal Audits), which includes six odd questions and five even ones, has a reliability rate of 80.2%, which is higher than the statistically admissible value of 70% and suggests that the scale is reliable. To confirm or disprove the theories, statistical analysis might be performed.

4.1 Results of Testing the Study Hypothesis

The Null Hypothesis: Artificial neural networks (ANNs) do not improve the quality of internal audits.

Employing the following regression model, we will conduct a simple linear regression analysis to evaluate this hypothesis:

$$QIA = B_0 + B_1(ANNS) + \varepsilon_i \dots \dots \dots (1)$$

Where:

QIA = dependent variable (internal audit quality).

ε_i = estimate errors, often known as statistical residuals.

B_0 = regression equation constant, which represents the value of the mediating variable when the internal audit quality value equals zero.

B_1 = slope of the regression function, which assesses the effect of the independent variable (ANNs) on the dependent variable (internal audit quality).

What follows is a summary of the findings from the SPSS statistical program:

Table 1: Testing the association between artificial neural network and internal audit quality			
		internal audit quality	ANN
Pearson Correlation	internal audit quality	1.000	.055
	ANNs	.055	1.000
Sig. (1-tailed)	internal audit quality	.	.133
	ANNs	.133	.
N	internal audit quality	417	417
	ANNs	417	417

The table above shows the variables in the regression matrix. The correlation coefficient reached 5.5% with a significance greater than 0.01, indicating no correlation. The association between the two variables is inverse and not statistically significant, with a Sig value of 0.133 for the independent and dependent variables, above the 5% threshold that is statistically acceptable in the social sciences.

Table 2: Estimating the parameters of a simple linear regression model to measure the impact of artificial neural networks on internal audit quality

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.055 ^a	.003	.001	2.72267
a. Predictors: (Constant), ANN _s				
b. Dependent Variable: internal audit quality				

The table above shows the Pearson correlation coefficient between the dependent and independent variables. The value of R between the variables reached 5.5%, which is a good value. The coefficient of determination R Square reached 0.003, representing the "explanatory power" of the model used. The independent variable (artificial neural networks) explains 0.03% of the variance in the dependent variable (internal audit quality). The standard deviation of the estimation error was 2.72267, which explains the statistical strength of the model.

Table 3: Regression significance test for the Null hypothesis

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.221	1	9.221	1.244	.265 ^b
	Residual	3076.362	415	7.413		
	Total	3085.583	416			
a. Dependent Variable: internal audit quality						
b. Predictors: (Constant), ANN _s						

The results of the regression significance analysis are as follows: the calculated F value is 1.244, which is less than its tabular value based on the degrees of freedom of (416.1). The mean square of the residuals is 3076.362, indicating a significance level higher than 5%. The Sig level is 0.265, which exceeds the error value considered statistically acceptable in the social sciences, suggesting potential implications for future research.

Table 4: Standardized and unstandardized coefficients for testing the null hypothesis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	45.554	2.345		19.422	.000
	ANN _s	.049	.044	.055	1.115	.265
a. Dependent Variable: quality of internal audits						

The table above shows that the value of the regression equation constant reached 45.554 and that the value of the slope of the regression equation reached 5.0%, which shows the effect of the independent variable (artificial neural networks) on the dependent variable (internal audit quality) through the coefficient B. The positive value of the coefficient indicates that there is a direct effect between the two variables, the independent and the dependent. In other words, any increase in the independent variable (artificial neural networks) by one degree leads to a 5% increase in the dependent variable (internal audit quality), with all other independent variables being constant. It is also noted from the table above that the significance level of the independent variable reached 0.265, which is greater than the acceptable error in

the social sciences, which is predetermined by 0.05. This means that the sample data provided acceptable evidence to reject the alternative hypothesis and accept the null hypothesis, as the effect is statistically proven. The result is that no significant effect of using artificial neural networks on internal audit quality exists.

Conclusion

Commercial and service-oriented organizations work tirelessly to survive in today's technologically advanced and fiercely competitive market by furnishing clients with products and services that meet and surpass their expectations regarding quality and precision. In order to overcome these obstacles, businesses must become more transparent, invest in research and development, and come up with new ideas to lower prices, increase efficiency, and satisfy customers. Professional groups and academics in accounting and auditing have been looking for ways to improve internal audits to generate more reliable financial reports. Internal auditing ensures organizations' security by detecting and preventing fraud and waste committed by management or staff. To do this, a system at the highest level is required, one that helps small businesses thrive, stay in business, and grow while making them more competitive. Applying AI, particularly artificial neural networks, to make optimal decisions at all levels of the economic unit is currently one of the most noticeable aspects of this progress. Artificial neural networks and other AI applications can improve the internal audit function's job and decision-making capabilities in many situations, much like they can in other financial unit departments.

This study represents a minor component of efforts to enhance the efficacy of internal auditing in Iraqi banks and improve its quality, prompted by the crises faced by several banks that quit the market owing to illicit actions. Nevertheless, the study's findings suggest that neural networks do not affect the quality of internal auditing, with the determining criteria being the independence and quality of the internal control system. Certain studies, including those by Merkhoufi et al. (2024) and Mitan (2024), indicate a significant influence of artificial intelligence on the quality of external auditing. Conversely, the research conducted by Arinola and Olalekan (2023) in Nigeria concluded that intelligence affects the quality of internal auditing. In this regard, researchers must investigate more in future studies to ascertain the correlation between various artificial intelligence tools and the quality of internal audits.

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