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The Impact of Artificial Intelligence on Enhancing the Quality of Accounting Information in Commercial Banks: Evidence from the Saudi Environment

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Abstract: This study aimed to identify the impact of utilizing artificial intelligence (AI) technologies on improving the quality of accounting information in Saudi commercial banks. To achieve the study's objectives, a questionnaire was designed and distributed to a convenience sample of financial managers, accountants, and internal auditors in these banks. The study sample comprised 342 individuals. Consequently, data were collected, analyzed, and hypotheses were tested. The study found a statistically significant positive impact of using AI technologies—through its four dimensions (machine learning, expert systems, neural networks, and the Internet of Things)—on enhancing the quality of accounting information in commercial banks in the Kingdom of Saudi Arabia. The study concluded with several recommendations, the most important of which are: the necessity for banks in the Kingdom of Saudi Arabia to focus on meeting the needs of accounting information users by providing high-quality information to aid their economic decision-making; the need for relevant accounting professional bodies in the Kingdom to organize specialized seminars, workshops, and training courses in the field of AI and its diverse applications in accounting, highlighting the importance of its implementation and the anticipated benefits; and the imperative to motivate financial managers, accountants, and internal auditors in Saudi commercial banks to adopt AI technologies in all banking operations related to the accounting and auditing profession.

Keywords: Artificial Intelligence, Accounting Information Quality, Saudi Commercial Banks.

1. Introduction

The business environment has witnessed significant developments in recent years, leading to the emergence of the information and communication technology (ICT) landscape. Undoubtedly, these developments have become integral to the global economic entity characterized by the use of information and technological innovations. This has prompted contemporary enterprises to conduct their operations with a substantial reliance on information technology, moving away from classical and traditional methods (Amerheim, 2022). Numerous studies (Giles, 2019; Bruun & Duka, 2018) have concluded on the necessity of adopting modern technologies in the accounting profession, despite the profession's relative responsiveness. These technologies have placed the accounting profession before a major challenge: the need to possess the tools enabling it to interact with the modern technical environment. A study by Schmitz & Leoni (2019) indicated that these tools comprise suitable infrastructure for implementing these modern technologies, including hardware and software, in addition to dedicated management for the systematic analysis of data to provide relevant information that contributes to forecasting future events.

Among the most prominent outcomes of the Fourth Industrial Revolution in information technology are the intensification of competition in the global market and the trend towards applying artificial intelligence (AI) technologies in performing tasks in general, and specifically in the financial and business sectors (Hammouda & Al-Aql, 2022). AI has become a pivotal tool in enhancing the quality of accounting information within the banking environment. Accounting is a core function that relies on a massive amount of data and precise financial details, making it potentially susceptible to human error and delays in task completion. Therefore, employing AI in accounting has become an imperative necessity rather than merely an option. Technologies such as robotic process automation, big data analytics, and predictive systems contribute to a qualitative shift in how accounting data is processed. A study by Al-Fartousi and Mohsen (2025) demonstrated that AI technologies are not limited to merely accelerating process performance but also contribute to improving the quality of accounting information by providing accurate future insights that enable management to formulate more efficient strategies.

At the level of banks in general, and specifically in the Kingdom of Saudi Arabia, there have been numerous rapid developments in the use of AI. These developments have become a fundamental pillar for improving accounting information within these banks. Saudi banks have moved to keep pace with technological trends in alignment with the objectives of Saudi

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Vision 2030, which has placed significant emphasis on digital transformation. Accordingly, the current study seeks to demonstrate the impact of using artificial intelligence applications on improving the quality of accounting information in commercial banks in the Kingdom of Saudi Arabia from the perspective of a sample of financial managers, accountants, and internal auditors.

2. Methodological Framework of the Study

2.1. Study Problem

Banks have recently turned to automating their operations to adapt to the competitive environment in which they operate and to ensure survival. Despite the significant impact automation has had on accelerating processes, achieving quality, and reducing costs, this impact has remained confined to routine tasks or work that does not require high skills. Consequently, banks have shifted towards implementing new technologies, such as artificial intelligence applications, which perform non-routine cognitive tasks (Al-Jaber, 2020). Among the most prominent advantages of using AI applications in banks is the significant time and effort they save accountants in accounting work. Despite these advantages, the use of AI applications is not without risks to accounting systems, such as the potential for manipulation of those systems.

The Saudi business environment is witnessing rapid developments through its attempts to keep pace with modern advancements in technology and communications. However, the use of artificial intelligence technologies in the field of accounting in general, and in banks specifically, is still in its early stages. This could represent an obstacle to establishing smart accounting in Saudi banks. Based on the above, the researchers can formulate the study's main problem in the following central question:

What is the impact of artificial intelligence technologies on improving the quality of accounting information in Saudi banks?

2.2. Significance of the Study

The study's theoretical significance lies in its pioneering nature, as it addresses the impact of artificial intelligence on improving the quality of accounting information in the banking sector of the Kingdom of Saudi Arabia, to the best of the researchers' knowledge. The study gains its scientific importance from the significance of artificial intelligence and the benefits of its application in banks, particularly by leveraging it to enhance the quality of accounting information. This, in turn, positively reflects on financial reports by making them more transparent and beneficial to stakeholders. Furthermore, the study represents an extension of previous research in the field of accounting and the use of AI technologies within it, thereby contributing—alongside other studies and research—to the development of the field and keeping pace with global advancements in this regard.

As for the study's practical significance, it lies in identifying the extent to which AI applications influence the improvement of accounting information quality in commercial banks in the Kingdom of Saudi Arabia. The researchers also anticipate that its findings and recommendations will benefit Saudi commercial banks by helping them understand the expected benefits of implementing AI technologies in the accounting domain and the subsequent impact on the quality of financial reports in those banks.

2.3. Study Objectives

The study primarily aims to identify:

a) The impact of machine learning technology on improving the quality of accounting information in Saudi banks.

b) The impact of expert systems technology on improving the quality of accounting information in Saudi banks.

c) The impact of neural networks technology on improving the quality of accounting information in Saudi banks.

d) The impact of Internet of Things (IoT) technology on improving the quality of accounting information in Saudi banks.

2.4. Study Variables

The independent variable in this study is artificial intelligence (machine learning technology, expert systems technology, neural networks technology, Internet of Things technology). The dependent variable is the improvement in the quality of accounting information.

3. Theoretical Framework of the Study

3.1. Artificial Intelligence

Numerous studies have focused on artificial intelligence (AI) technologies and their uses in accounting practice. Ping & Ying

(2018) defined AI as a technology dedicated to programming machines to perform tasks that would otherwise require human intelligence to solve, essentially simulating intelligent human behavior to enable learning and the autonomous use of acquired knowledge for problem-solving. Gusai (2019) views AI as the simulation of human intelligence processes by machines, particularly computer systems. This includes specific AI applications such as expert systems, natural language processing, speech recognition, and machine vision.

Amerheim (2022) defined AI technologies as a computer science discipline concerned with designing intelligent information systems that exhibit characteristics akin to human intelligence in behavior. They operate by processing descriptions of objects, events, and processes using their qualitative properties and logical/mathematical relationships in an intelligent manner. Abul-Enein (2020) views AI as a modern science based on a harmonious and interconnected framework of mathematical rules, hardware, and software integrated into computers, which in turn perform many of the operations and tasks a human can accomplish, differing, however, in terms of speed and accuracy in finding solutions to complex and difficult-to-solve problems. A study by Al-Sayyed et al. (2022) indicated that the fundamental principle underlying AI does not lie merely in solving problems faster, processing more data, or storing more information by mimicking the human mind. Rather, the correct foundational principle for this field is actually the principle of processing information—regardless of its nature or volume—in an automated or semi-automated manner, and in a way suitable for and compatible with a specific objective. It is worth noting here that "semi-automated" refers to user (human) intervention in the processing.

Based on the foregoing, the researchers can define artificial intelligence as one of the technological revolution's developments in intelligent computer systems. These systems possess characteristics associated with intelligence and decision-making that are, to some extent, similar to human behavior in this domain concerning languages, learning, reasoning, and problem-solving ability.

Numerous studies (Amerheim, 2022; Al-Shatnawi et al., 2020) have pointed out that the importance of artificial intelligence in the business field is as follows:

1. AI contributes to preserving accumulated human expertise by transferring it to intelligent machines.
2. It enables humans to use natural language in interacting with machines instead of computer-based programming languages, thereby making the use of machines accessible to everyone, including people with disabilities, whereas interacting with advanced machines was previously limited to specialists and experts.
3. AI plays a significant role in many sensitive fields, such as assisting in medical and legal sciences, security and military domains, accounting, auditing, and other fields.
4. Intelligent systems are characterized by autonomy, accuracy, and objectivity, leading to correct decisions.
5. Intelligent systems alleviate considerable psychological stress and risks for humans, allowing them to focus on more important and more human-centric matters.

Given the significant importance of artificial intelligence systems and modern information technology, due to the advantages and conveniences they provide based on their distinctive characteristics, they play a major role in developing corporate operations and enhancing their performance. Numerous studies (Biswas et al., 2014; Dutta et al., 2017; Mahapatra et al., 2019; Heye, 2021; Al-Azzam, 2021; OECD, 2023) have concluded that the most important benefits achievable through the application of AI technologies are as follows:

1. **Knowledge Representation Capability:** Unlike statistical software, AI programs incorporate a method for representing information, as they utilize a structure that accounts for missing data.
2. **Ability to Handle Incomplete Information:** Another capability of AI programs is their ability to find some solutions even when information is not fully available at the time a solution is requested. While the consequences of incomplete information may lead to less realistic or less reliable conclusions, on the other hand, the conclusions may still be correct.
3. **Learning Ability:** A significant characteristic of AI is its ability to learn from past experiences and practices, as well as to improve performance by considering previous errors. This capability is linked to the ability to generalize information, deduce similar cases, and be selective by ignoring redundant information.
4. **Inference Capability:** This is the ability to deduce possible solutions to a specific problem based on known data and past experiences, used for problems that cannot be solved with known traditional methods. This capability is realized on computers, which store all possible solutions in addition to using rules, inference strategies, and logic principles.

In light of the above, the researchers believe that despite the multiple advantages of AI—such as knowledge representation, handling incomplete data, learning, and inferring solutions—the fundamental objective of its use is to obtain accurate information for decision-making. Not all AI tools provide all these advantages; some tools serve at least one benefit, but they

are not all integrated into a single algorithm. This has led to the emergence of various models of AI algorithms.

3.2. Artificial Intelligence Technologies

3.2.1. Machine Learning Technology

Machine learning (ML) is an integral part of artificial intelligence and is so widely used that it is often conflated with AI itself (Weber, 2020). Machine learning works to improve learning based on data and performs numerous tasks via computer devices, using training data and algorithms in particular. A device or program can learn to perform specific tasks if it acquires prior experience in the form of relevant data; with the completion of each task, the machine's experience increases, meaning it learns rapidly (Url, 2021).

3.2.2. Expert Systems Technology

According to Abul-Enein (2020), expert systems technology is one of the oldest and most important AI technologies and a type of knowledge-based system. It is viewed as knowledge engineering in the applied field. It utilizes a database of knowledge derived from experts, which is prepared and stored in the expert system, including training, rules, concepts, facts, relationships, and professional practices, to be referred to when needed for making decisions and accomplishing tasks in a manner that achieves the user's objective. The researchers believe that the use of expert systems has become a tangible reality extending to the practical operations of some companies and accounting/auditing firms, serving as an assistive tool whose primary task is to rationalize the accountant's personal judgment. Its use positively impacts the process of information quality: it contributes to the speed of planning and executing audit programs, reduces the cost of performing the audit process, and enables its completion in the shortest possible time while ensuring accuracy. It also plays a fundamental role in assisting with the training of accountants and auditors by demonstrating how to make a specific decision and how to link the necessary information to rationalize the auditor's opinion and decision. Furthermore, it helps new accountants and auditors acquire knowledge and experience relatively quickly, training them, developing their capabilities, and increasing their efficiency (Mehta et al., 2022).

3.2.3. Artificial Neural Networks Technology

Although artificial neural networks (ANNs) have existed for several decades, their widespread application has only occurred relatively recently. The forces that have made ANNs more viable for large-scale application today are increased computing power and the availability of big data (Jain, 2020). Neural networks are defined as a processing technology that simulates the way the human brain and nervous system perform a specific task. This technology has developed significantly due to advances in neuroscience to understand the brain's mechanisms in logical inference and processing, achieved through massively distributed parallel processing composed of simple processing units called nodes or neurons (Mehta et al., 2022).

There are numerous applications of artificial neural network technology in the field of accounting and auditing which have proven their competence and high capability compared to other traditional methods. They are found to be more robust and efficient in extracting hidden knowledge, being a computational technology within AI that works by mimicking the human brain to perform specific tasks (Krishna et al., 2022).

3.2.4. Internet of Things Technology

Ben et al. (2019) view Internet of Things (IoT) technology as a network formed from physical objects interconnected electronically with sensors, monitoring, and interaction devices within an enterprise to achieve maximum flexibility, transparency, and traceability of information. Wu & Li (2019) defined the Internet of Things as the interconnection between physical objects and the digital world. Based on the above, the researchers believe that the Internet of Things aims for purposeful and coordinated collaboration between sensors and communication technologies to achieve common objectives.

3.3. Quality of Accounting Information

The concept of accounting information quality refers to the credibility of this information and the benefit it provides to its users and stakeholders, meaning it is free from misstatement and misrepresentation, and is prepared in accordance with a set of professional and technical standards (Diash, 2017). According to the Special Committee on Financial Reporting of the American Institute of Certified Public Accountants (AICPA), accounting information quality means the ability to use information for prediction to achieve objectives (Al-Hajjawi & Aal Fathallah, 2017). Based on the above, the researchers can define accounting information quality as information prepared in accordance with information quality standards (the qualitative characteristics of accounting information).

The quality of accounting information is generally linked to the necessity of having a number of fundamental qualitative characteristics and enhancing characteristics. The researchers present them as follows:

3.3.1. Fundamental Qualitative Characteristics

The fundamental characteristics of accounting information consist of two main attributes:

- **Relevance:** For accounting information to be useful, it must be relevant to the needs of its users and stakeholders. Altaji (2019) posits that relevant financial information is capable of making a difference in the decisions made by users. Financial information has predictive value if it can be used as input for processes upon which users rely to forecast future outcomes. Such information, along with its predictive value, is used by users in forming their own expectations. Consequently, relevance implies that information has the ability to influence the decision-making process. Generally, information is considered relevant if its absence would lead to a different decision than the one made in its presence. For accounting information to be relevant, certain attributes must be present, such as timeliness, predictive value, and confirmatory value (feedback).
- **Reliability:** For accounting information to be useful, it must be reliable. Accounting information acquires the characteristic of reliability when it is free from material errors and distortions (Abdulsamad, 2017). It also requires the presence of a set of subsidiary characteristics such as neutrality, faithful representation, and verifiability (Al-Hajjawi & Aal Fathallah, 2017).

3.3.2. Enhancing Qualitative Characteristics of Accounting Information

These are represented by the following characteristics:

- **Comparability:** This characteristic enables users and stakeholders of accounting information to identify the real aspects of similarities and differences between an entity's performance and that of other entities over a specific period, and allows them to compare performance across different time periods (Atta & Daraousi, 2021). Based on this, the researchers believe that the characteristic of comparability enables temporal comparison by allowing comparisons between years within the same entity or with similar other entities.
- **Understandability:** The characteristic of understandability is considered one of the most important enhancing characteristics of accounting information. This characteristic requires users to have a reasonable level of knowledge of business, economic activities, and accounting, as well as the willingness to study and analyze the information (Kao, 2014).
- **Consistency:** Consistency means that an entity is consistent in applying its accounting policies from one period to another. However, this does not imply that consistency in applying accounting policies is absolute. An entity may change its adopted accounting policy if the change leads to greater transparency in the financial statements. The entity is obligated to disclose any change in its accounting policies by clarifying the justifications that prompted the change.

Based on the above, the researchers believe that there are potential trade-offs between the fundamental qualitative characteristics and the enhancing characteristics of accounting information quality. For example, a trade-off may occur between timeliness and predictive value, where the speed of preparing accounting information may come at the expense of accuracy and completeness. There may also be a lack of alignment between the relevance of information and its reliability; information may be relevant but not reliable, or vice versa.

4. Previous Studies

The researchers have dedicated this section of the study to examining the impact of artificial intelligence applications on improving the quality of accounting information. The researchers noted a scarcity of studies addressing this topic at the level of the Saudi environment in general, and specifically at the level of Saudi banks. The following presents a review of the most important studies relevant to the topic of the current research:

Kashmir (2025) conducted a theoretical study aimed at demonstrating the impact of AI applications—through its dimensions (expert systems, neural networks, genetic algorithms)—on achieving the quality of financial reports in Egyptian commercial banks by providing the fundamental and secondary characteristics and components of accounting information. The study concluded that AI leads to increased effectiveness and enhanced efficiency of the accounting system in Egyptian commercial banks by improving the characteristics of accounting information (relevance, faithful representation, comparability, and understandability).

Ali (2025) conducted a study aimed at identifying the uses of AI in the field of accounting and its role in improving the quality of accounting information in the Sudanese Agricultural Bank. The study employed the historical method and the descriptive-analytical approach. It also utilized a questionnaire as the primary tool in the data collection stage, which was distributed to a sample of (45) individuals comprising financial managers, department heads, and employees at the bank

under study. The study concluded that AI technologies play a prominent role in improving the quality of accounting information in the bank.

A study by Abdulaziz (2025) attempted to identify the implications of AI applications on the accounting profession in Libyan companies. To achieve the study's objective, a questionnaire tool was used and distributed to a sample of (34) individuals working in the financial departments of those companies. Among the most significant findings of the study was the existence of a statistical relationship between the use of AI technologies and the quality of accounting information in the companies constituting the study sample.

A study by Ougeiba (2023) aimed to identify the impact of AI on improving the quality of accounting information in Algerian institutions from the perspective of accountants and university professors. The study relied on the descriptive method and utilized a questionnaire tool during the data collection stage, where (49) questionnaires were distributed to a sample of accountants and university professors in Algeria. The study concluded that there is a statistically significant positive impact of applying AI on improving the quality of accounting information in Algerian institutions.

A study by Al-Mileigi et al. (2023) aimed to demonstrate the impact of expert systems as a method of artificial intelligence on improving financial reports in the banking sector in Egypt. The study relied on the inductive and deductive methods and surveyed the opinions of a sample of accountants and managers in Egyptian banks, totaling (148) individuals. Among the most important findings of the study was that the application of expert systems technology helps increase the relevance of the information contained in financial reports.

A study by Taher and Ahmed (2022) attempted to identify the role of artificial intelligence technologies in improving the quality of accounting information in Iraqi institutions. The study used the descriptive-analytical method and employed a questionnaire as a tool for data collection, distributing (70) questionnaires to the study sample, which consisted of a group of university and institute professors in the Kurdistan Region of Iraq. The study found a significant positive relationship between AI technologies (machine learning, deep learning, modern accounting software, experience, training, and technical knowledge) and the quality of accounting information.

Al-Ghazawi (2021) conducted a study aimed at identifying the impact of using AI applications through its dimensions (expert systems, neural networks, genetic algorithms, intelligent agents) on improving the quality of accounting information from the perspective of Jordanian certified public accountants. The study employed the descriptive and analytical method and used a questionnaire to measure the study variables, distributing (171) questionnaires to a sample of Jordanian certified public accountants. The study reached several results, the most important of which was the existence of a statistically significant impact of using AI technologies on the quality of accounting information.

A study by Al-Shatnawi et al. (2019) attempted to test the impact of AI applications on improving the quality of accounting information in Jordanian public shareholding companies. To achieve the study's objective, a field study was conducted on a sample of financial report preparers in those companies. The study used the descriptive-analytical method by applying simple linear regression. The results showed a statistically significant impact of using AI applications on the relevance, faithful representation, and verifiability of accounting information.

Considering the reviewed studies related to the variables of the current study, the researchers conclude that the current study shares similarities with previous studies in its theoretical framework concerning artificial intelligence. It also aligns with some of them in certain study variables (dimensions of AI) and in the statistical methodology employed (descriptive method). The primary distinction between the current study and the reviewed ones lies in the application environment. The current study was applied in the banking sector of the Kingdom of Saudi Arabia, and the researchers did not find any previous study that addressed the topic of the current study within the Saudi environment, indicating the novelty and originality of this research. Despite the diversity of environments in which the reviewed studies were conducted, they constituted a rich source of information that benefited the current study in its theoretical framework, problem identification, and hypothesis formulation.

5. Study Hypotheses

Based on the foregoing presentation in the theoretical framework, the findings of previous studies, and considering the dimensions of artificial intelligence technologies and the dimensions of accounting information quality, the researchers can formulate the main study hypothesis as follows:

- There is a statistically significant impact at the significance level ($\alpha \leq 0.05$) of using artificial intelligence on improving the quality of accounting information in Saudi commercial banks.

The following sub-hypotheses branch from the main hypothesis:

1. There is a statistically significant impact at the significance level ($\alpha \leq 0.05$) of using machine learning technology on improving the quality of accounting information in Saudi commercial banks.
2. There is a statistically significant impact at the significance level ($\alpha \leq 0.05$) of using expert systems technology on improving the quality of accounting information in Saudi commercial banks.
3. There is no statistically significant impact at the significance level ($\alpha \leq 0.05$) of using artificial neural networks technology on improving the quality of accounting information in Saudi commercial banks.
4. There is a statistically significant impact at the significance level ($\alpha \leq 0.05$) of using Internet of Things (IoT) technology on improving the quality of accounting information in Saudi commercial banks.

6. Study Methodology

Given the nature and objectives of the study, the descriptive-analytical method was adopted. This method focuses on describing the phenomenon under study, analyzing its dimensions and characteristics, and then interpreting its various relationships to reach generalizable conclusions for the study population (Malih & Abdulsamad, 2020). The study also employed the standard quantitative method (simple linear regression analysis) to measure and analyze the impact of implementing a balanced scorecard on improving the quality of accounting information in Saudi commercial banks. The study relied on two types of sources:

1. **Secondary Sources:** These include books, periodicals, reports, articles, the international information network (the Internet), and previous studies in the study's theoretical framework.
2. **Primary Sources:** The researchers designed and developed a questionnaire to test the impact of implementing a balanced scorecard on improving the quality of accounting information in Saudi commercial banks.

7. Study Population and Sample

The study population comprised all financial managers, accountants, and internal auditors in Saudi commercial (local) banks, which number 13 banks according to the Saudi Central Bank's website (https://2u.pw/cgwNZkmq). Due to the large size and geographical spread of the study population across the regions and cities of the Kingdom of Saudi Arabia, and considering time, effort, and cost constraints, the researchers adopted a systematic random sampling method. This approach aimed to represent financial managers, accountants, and internal auditors in the study sample in proportion to their availability in the overall population.

The researchers distributed questionnaires through direct distribution to the study sample in (10) commercial banks, representing 77% of the total number of commercial banks in the Kingdom of Saudi Arabia. The number of questionnaires distributed to the study sample was 384. A total of 342 questionnaires were retrieved, representing 89% of the distributed questionnaires. All retrieved questionnaires were complete and valid for analysis.

8. Study Instrument

The researchers designed a questionnaire aimed at testing the impact of artificial intelligence on improving the quality of accounting information in the Kingdom of Saudi Arabia. This was done after reviewing the study's literature, including previous studies and research such as those by (Kashmir, 2025; Taher & Ahmed, 2022; Al-Shatnawi et al., 2019). The researchers developed the questionnaire to align with the study's topic, specialization, and the business environment in which it was conducted. The questionnaire consisted of two main sections: the first related to the dimensions of artificial intelligence, and the second to the quality of accounting information. The questionnaire contained a total of 39 items related to the study variables (items for AI dimensions and accounting information quality).

Validity and Reliability of the Study Instrument

Validity refers to the extent to which the questionnaire items measure what they are intended to measure. The researchers verified the validity and reliability of the study instrument using two methods:

a. **Face Validity:** The researchers presented the study instrument to a panel of specialists holding the rank of professor or associate professor in accounting and artificial intelligence technologies from several Saudi universities. The purpose was to benefit from their expertise, and modifications to the instrument's items were made based on their suggestions.

b. **Cronbach's Alpha Reliability:** After making the necessary modifications to the questionnaire, distributing it to the study sample, and collecting the final data, the researchers applied Cronbach's alpha test to verify the internal consistency of the items for the dimensions of artificial intelligence and accounting information quality. The table and figure below illustrates this.

Table 1: Results of Cronbach's Alpha Coefficient Measurement for the Study Instrument

Variables	Number of Items	Reliability Coefficient (Alpha)
Artificial Intelligence	27	0.79
Accounting Information Quality	12	0.71

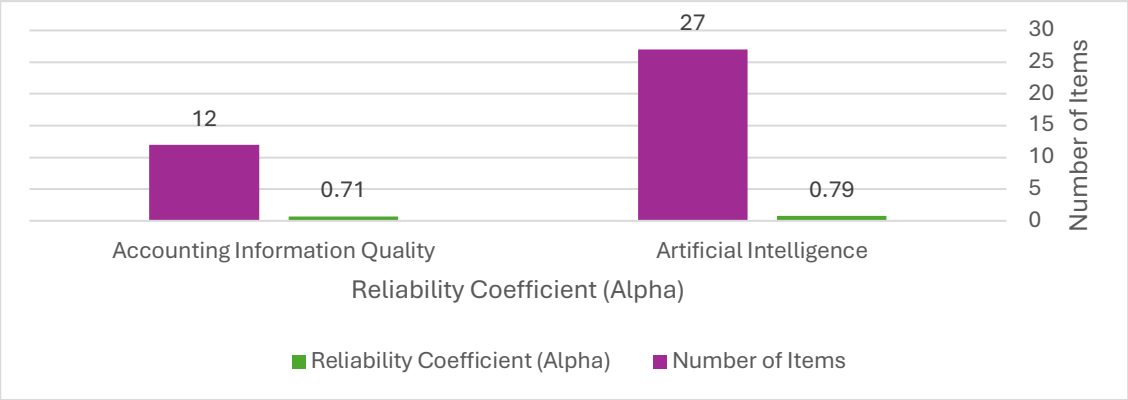

Fig. 1: Results of Cronbach's Alpha Coefficient Measurement for the Study Instrument

The results in Table (1) indicate a very strong level of consistency among the measurement items for both study variables, with coefficients ranging between 71% and 79%. Given that the benchmark value for Cronbach's alpha reliability in management research is considered acceptable if it exceeds 60%, the reliability coefficients for the study variables are high and acceptable.

Study Data Analysis

This section of the study was dedicated to identifying the level of the study's dimensions (artificial intelligence and accounting information quality) using the arithmetic mean and standard deviation. A dimension is considered rejected if its arithmetic mean is less than 3. The following two tables and figures illustrate this.

Table 2: Descriptive Statistics for the Independent Variable (Artificial Intelligence)

No.	Dimension	Arithmetic Mean	Standard Deviation	Rank
1	Machine Learning Dimension	3.73	0.24	1
2	Expert Systems Dimension	3.46	0.43	4
3	Neural Networks Dimension	3.65	0.37	3
4	Internet of Things Dimension	3.70	0.29	2

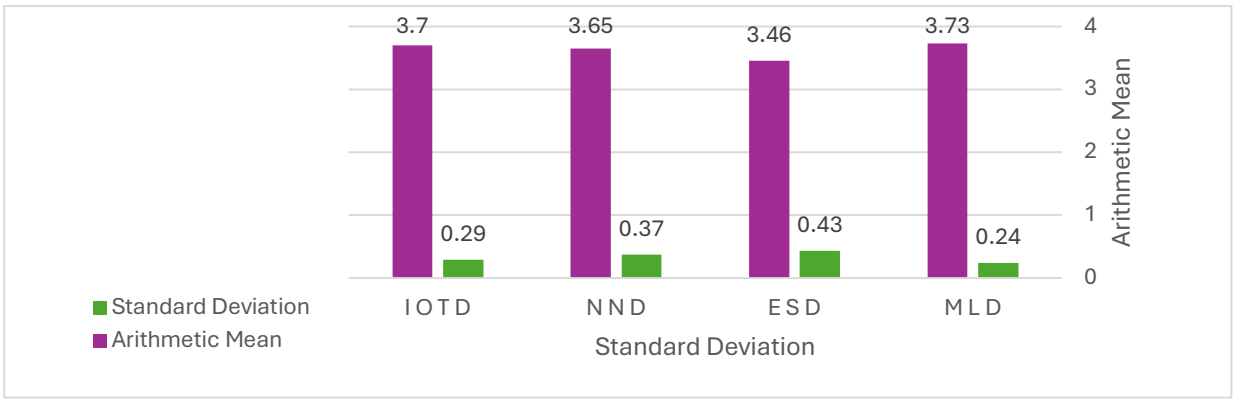

Fig. 2: Descriptive Statistics for the Independent Variable (Artificial Intelligence)

For the surveyed sample, the Expert Systems variable achieved the fourth rank with an arithmetic mean

of 3.46 and a standard deviation of 0.43. The Neural Networks dimension achieved the third rank with a mean of 3.65 and a standard deviation of 0.37. The Internet of Things dimension achieved the second rank with a mean of 3.70 and a standard deviation of 0.29. The Machine Learning dimension ranked first with a mean of 3.73 and a standard deviation of 0.24. From the analysis results, the researchers conclude that the dimensions of the independent variable (artificial intelligence) are

considered acceptable, as the arithmetic mean for all variables was greater than the hypothetical mean of 3.

Table 3: Descriptive Statistics for the Dependent Variable (Accounting Information Quality)

No.	Variable	Arithmetic Mean	Standard Deviation	Rank
1	Relevance Characteristic	3.61	0.39	3
2	Reliability Characteristic	3.76	0.44	1
3	Comparability Characteristic	3.57	0.46	4
4	Understandability Characteristic	3.52	0.39	5
5	Consistency Characteristic	3.67	0.67	2

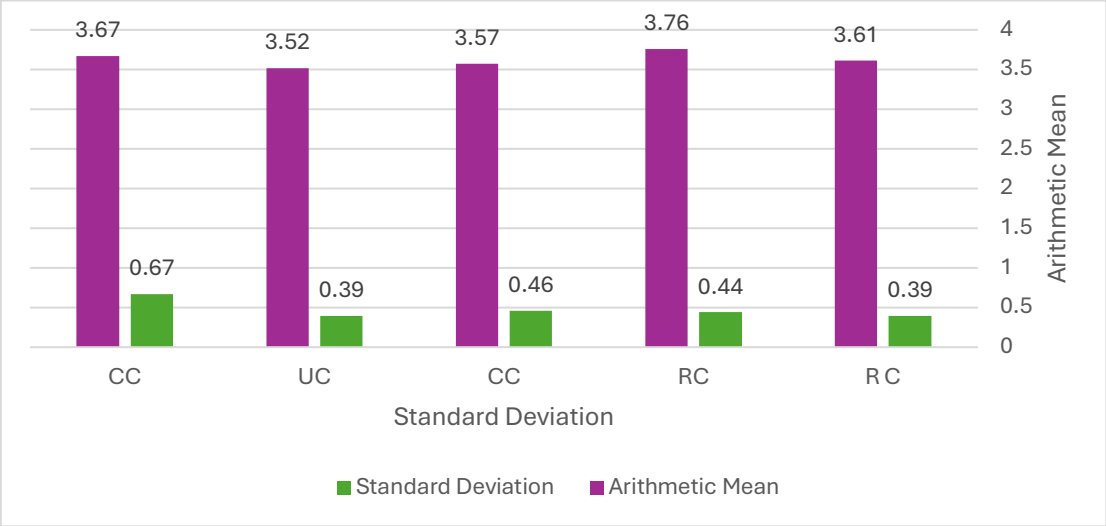

Fig. 3: Descriptive Statistics for the Dependent Variable (Accounting Information Quality)

For the surveyed sample, the Understandability Characteristic variable achieved the fifth rank with an arithmetic mean of 3.52 and a standard deviation of 0.39. The Comparability Characteristic variable achieved the fourth rank with a mean of 3.57 and a standard deviation of 0.46. The Relevance Characteristic variable achieved the third rank with a mean of 3.61 and a standard deviation of 0.39. The Consistency Characteristic variable came in second with a mean of 3.67 and a standard deviation of 0.67. Finally, the Reliability Characteristic variable achieved the first rank with a mean of 3.76 and a standard deviation of 0.44. From the analysis results, the researchers conclude that the dimensions of the dependent variable (accounting information quality) are considered acceptable, as the arithmetic mean for all variables was greater than the hypothetical mean of 3.

Testing the Study Hypotheses

This part of the study was dedicated to discussing the results of testing and analyzing the causal relationships between the study variables, for both the main hypothesis and its sub-hypotheses, as follows:

1. Testing the Causal Relationship for the Main Hypothesis:

The results of testing the causal relationship between the use of artificial intelligence and accounting information quality can be expressed according to the results of multiple regression analysis. This assumes a functional relationship between the true value of AI dimensions (X) and accounting information quality (Y) using the following equation:

$$Y = a + \beta X$$

Where:
Y = Accounting information quality.
X = AI dimensions.
a = Constant.
β = Slope of the equation (the amount of change in Y resulting from a one-unit change in X).

This equation illustrates that accounting information quality is a function of the true value of AI dimensions. The multiple regression equation for the relationship between the two variables was as follows:

Accounting Information Quality = (1.364) + (0.798) AI Dimensions.

Accordingly, ANOVA (Analysis of Variance) was used for the two variables, yielding the following results:

Table 4: ANOVA Analysis for the Relationship between AI and Accounting Information Quality

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Squares	R^2	Calculated F-value	Significance Level
Regression	1	24.98	15.09	0.681	79.549	0.000
Error	145	8.78	0.054			
Total	**146**	**33.76**				

The coefficient values are indicated in Table (5) below:

Table 5: Regression Coefficients

Statement	Unstandardized Coefficients		Standardized Coefficients		Significance Level
Model	**Beta Coefficient**	**Standard Error**	**Beta**	**T-test**	
Constant	1.364	0.256	0.797	0.000	0.000
Balanced Scorecard	1.397	0.008		36.12	0.000

As evident from Tables (4) and (5) (the ANOVA table and the coefficients table for the relationship between artificial intelligence dimensions (X) and accounting information quality (Y)), and based on the study sample of 147 individuals, the calculated T-test value (17.719) is statistically significant at the (0.05) level. This indicates that the regression model is adequate for describing the relationship between (X and Y) with a 95% confidence level. The constant (a=1.364) signifies that accounting information quality is achieved at a baseline level of (1.364) when the value of the artificial intelligence dimensions is zero.

The value of the coefficient of determination (R^2), which is 0.681, explains that artificial intelligence accounts for 68% of the variance in accounting information quality within Saudi banks. The calculated F-test value for the artificial intelligence dimensions reached 79.549 with a significance level of (0.000). This result is statistically significant at the (0.05) level. Consequently, the study's main hypothesis, which stated, "There is a statistically significant impact at the significance level ($\alpha \leq 0.05$) of using artificial intelligence on improving the quality of accounting information in Saudi commercial banks," has been validated.

2. Testing the Causal Relationship for the Sub-Hypotheses

After testing the main causal hypothesis, the researchers proceeded to test the extent of the impact of the individual AI dimensions (Machine Learning dimension, Expert Systems dimension, Neural Networks dimension, Internet of Things dimension) on the quality of accounting information in Saudi banks. This was done using a multiple regression equation with the AI dimension variables (X_1, X_2, X_3, X_4). The table below illustrates this.

Table 6: Results of Testing the Impact of AI Dimensions on Accounting Information Quality

Statement	Unstandardized Coefficients		Standardized Coefficients		Significance Level
Model	**Beta Coefficient**	**Standard Error**	**Beta**	**T-test**	
Constant	1.364	0.298	0.781	0.000	0.000
Machine Learning Dimension (X_1)	1.327	0.240	0.658	16.09	0.000
Expert Systems Dimension (X_2)	1.745	0.187	0.749	12.04	0.000
Neural Networks Dimension (X_3)	1.529	0.167	0.638	15.27	0.000
Internet of Things Dimension (X_4)	1.687	0.219	0.543	13.48	0.000

As is clear from Table (6), the multiple regression equation is as follows:

Accounting Information Quality = (1.364) + (0.658) Machine Learning Dimension + (0.749) Expert Systems Dimension + (0.638) Neural Networks Dimension + (0.543) Internet of Things Dimension.

Based on the results presented in the table, the validity of the sub-hypotheses can be verified as follows:

First Sub-Hypothesis:

This hypothesis stated, "There is a statistically significant impact at the significance level ($\alpha \leq 0.05$) of using machine learning technology on improving the quality of accounting information in Saudi commercial banks."

To verify the validity of this hypothesis, and according to the results indicated in Table (6), the marginal slope coefficient for the Machine Learning dimension ($\beta_1 = 0.658$), associated with (X_1), was calculated. This indicates that if the Machine Learning dimension changes by (1) unit, it will lead to a positive change of (0.658) in accounting information quality. It is concluded, therefore, that there is a positive, statistically significant impact at the ($\alpha \leq 0.05$) level for using the Machine Learning dimension as one of the AI dimensions in improving the quality of accounting information in Saudi banks. Thus, the validity of the first sub-hypothesis of the study has been verified.

Second Sub-Hypothesis:

This hypothesis stated, "There is a statistically significant impact at the significance level ($\alpha \leq 0.05$) of using expert systems technology on improving the quality of accounting information in Saudi commercial banks."

To verify the validity of this hypothesis, and according to the results indicated in Table (6), the marginal slope coefficient for the Expert Systems dimension ($\beta_2 = 0.749$), associated with (X_2), was calculated. This indicates that if the Expert Systems dimension changes by (1) unit, it will lead to a positive change of (0.749) in accounting information quality. It is concluded, therefore, that there is a positive, statistically significant impact at the ($\alpha \leq 0.05$) level for using the Expert Systems dimension as one of the AI dimensions in improving the quality of accounting information in Saudi banks. Thus, the validity of the second sub-hypothesis of the study has been verified.

Third Sub-Hypothesis:

This hypothesis stated, "There is **no** statistically significant impact at the significance level ($\alpha \leq 0.05$) of using artificial neural networks technology on improving the quality of accounting information in Saudi commercial banks."

To verify the validity of this hypothesis, and according to the results indicated in Table (6), the marginal slope coefficient for the Neural Networks dimension ($\beta_3 = 0.638$), associated with (X_3), was calculated. This indicates that if the Neural Networks dimension changes by (1) unit, it will lead to a positive change of (0.638) in accounting information quality. It is concluded, therefore, that there **is** a positive, statistically significant impact at the ($\alpha \leq 0.05$) level for using the Neural Networks dimension as one of the AI dimensions in improving the quality of accounting information in Saudi banks. Consequently, this refutes the original null hypothesis (H_3) as stated.

Fourth Sub-Hypothesis:

This hypothesis stated, "There is a statistically significant impact at the significance level ($\alpha \leq 0.05$) of using the Internet of Things dimension on improving the quality of accounting information in Saudi banks."

To verify the validity of this hypothesis, and according to the results indicated in Table (6), the marginal slope coefficient for the Internet of Things dimension ($\beta_4 = 0.543$), associated with (X_4), was calculated. This indicates that if the Internet of Things dimension changes by (1) unit, it will lead to a positive change of (0.543) in accounting information quality. It is concluded, therefore, that there is a positive, statistically significant impact at the ($\alpha \leq 0.05$) level for using the Internet of Things dimension as one of the AI dimensions in improving the quality of accounting information in Saudi commercial banks. Thus, the validity of the fourth sub-hypothesis of the study has been verified.

9. Results:

Based on the data analysis results, the study reached the following findings:

1. There is a positive, significant impact at the level ($\alpha \leq 0.05$) for using the **Machine Learning** dimension as one of the AI dimensions in improving the quality of accounting information in commercial banks in the Kingdom of Saudi Arabia.
2. There is a positive, significant impact at the level ($\alpha \leq 0.05$) for using the **Expert Systems** dimension as one of the AI dimensions in improving the quality of accounting information in commercial banks in the Kingdom of Saudi Arabia.
3. There is a positive, significant impact at the level ($\alpha \leq 0.05$) for using the **Neural Networks** dimension as one of the AI dimensions in improving the quality of accounting information in commercial banks in the Kingdom of Saudi Arabia.
4. There is a positive, significant impact at the level ($\alpha \leq 0.05$) for using the **Internet of Things** dimension as one of the AI dimensions in improving the quality of accounting information in commercial banks in the Kingdom of Saudi Arabia.

10. Study Limitations:

The current study has some limitations that may restrict the generalizability of its findings. These stem from its reliance on statistical sampling methods due to the geographical dispersion of commercial banks across the regions, cities, and governorates of the Kingdom of Saudi Arabia. Furthermore, limitations include the level of responsiveness from the targeted

group of accountants in the banks under study in completing the distributed questionnaires, as well as the submission of incomplete questionnaires by some sample members, which led to their exclusion from the valid data for analysis.

11. Recommendations:

In light of the study's findings, the researchers recommend the following:

1. The necessity for banks in the Kingdom of Saudi Arabia to focus on the needs of accounting information users by providing high-quality information to assist them in rationalizing their economic decisions.
2. Motivating financial managers, accountants, and internal auditors in commercial banks in the Kingdom of Saudi Arabia to utilize artificial intelligence applications in all processes and transactions related to the accounting and auditing profession.
3. The necessity for relevant accounting professional bodies in the Kingdom of Saudi Arabia, such as the Saudi Organization for Auditors and Accountants, to organize specialized seminars, workshops, and training courses to introduce artificial intelligence, its uses in the field of accounting, and the implications of its application on the quality of accounting information.
4. Updating the accounting curricula in higher education institutions in the Kingdom of Saudi Arabia by incorporating dedicated courses in the field of artificial intelligence.

12. Suggested Future Research:

Based on the study's findings and recommendations, the researchers propose some ideas that may be suitable as topics for future research on variables not addressed in the current study:

1. The Impact of Artificial Intelligence Technologies on the Transparency of Financial Reports in Saudi Banks.
2. The Impact of Using Artificial Intelligence Technologies on Improving the Quality of Financial Decisions in Saudi Banks.
3. The Impact of Using Artificial Intelligence Technologies on Improving the Quality of Internal Auditing in Saudi Banks.

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