

The Role of Artificial Intelligence Techniques in Developing Accounting Information Systems and their Relationship to Big Data: A Case Study of Jordanian Commercial Banks

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Abstract

This paper examines the role of artificial intelligence techniques in developing accounting information systems and their relationship to big data in Jordanian commercial listed banks on the Amman Stock Exchange. Using the multiple regression model on a sample of about 30.1% of the employees working in Jordanian-listed banks (300 questionnaires), we find that a significant impact of artificial intelligence on the effectiveness of Accounting Information Systems. We also find a close relationship between artificial intelligence, big data, and the effectiveness of accounting systems. This result provides a highly competitive advantage for banks if they can benefit from and process them because they provide a deeper understanding of their customers and their requirements, and this helps them make appropriate decisions more effectively, based on the information extracted from them.

Keywords: *Big data, effectiveness of Computer Information Systems, artificial intelligence, commercial banks.*

1. Introduction

The last two decades have witnessed the burgeoning of accounting literature that confirms the relevance of the impact of artificial intelligence on the accounting systems of information in banks. Indeed, contemporary developments and improvements in information technology have helped provide opportunities for banks to improve their efficiency by improving and developing methods for exchanging information them. These developments have contributed to increasing competitiveness by providing methods that help increase revenues and reduce costs, as there is an important relationship between information systems and big data for each bank. Among commercial banks, the volume, speed, and diversity (characteristics of big data) help in the availability of information at the appropriate time.

Banking is one of the oldest in the world, but it has not always been at the forefront of technological innovation. However, this is rapidly changing with the advent of artificial intelligence (AI). There is no denying the importance of artificial intelligence in the improvement and development of many areas, including commercial banks. Advanced technologies and artificial intelligence have significantly affected the accounting system of these banks, radically changing how financial transactions are managed and recorded.

Artificial intelligence plays a crucial role in the development of accounting information systems by automating tasks, increasing data accuracy, and efficiently identifying patterns

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or irregularities in financial data. In the banking sector, AI aids in managing large volumes of financial transactions, minimizing risks, and improving customer service. When combined with big data analytics, AI allows banks to quickly analyze extensive datasets, extract valuable insights, and make informed decisions to enhance financial management and regulatory compliance. This collaboration between AI and big data enables commercial banks to streamline operations, reduce risks, and offer improved services to their customers.

One of the main effects of Artificial intelligence techniques can automate repetitive and rule-based tasks in accounting systems, such as data entry, reconciliation, and financial reporting. This automation reduces the chances of errors and frees up accountants' time to focus on more strategic and analytical tasks. AI-powered robotic process automation (RPA) can streamline and accelerate these processes, improving efficiency and productivity.

Furthermore, artificial intelligence can help streamline regulatory compliance by ensuring accurate reporting and adherence to established guidelines. By being able to quickly process vast amounts of information, artificial intelligence can help banks stay up to date with changing regulations and reduce the risk of non-compliance. However, it is important to note that although AI offers great advantages in terms of speed and accuracy, human censorship remains critical. Accountants also play a vital role in interpreting insights provided by AI systems and making informed decisions based on their expertise.

Our study highlights the importance of AI applications and the impact that some of its technologies may produce on the effectiveness of accounting information systems and their relationship to big data in commercial banks listed on the Amman Securities Exchange.

In this paper, we seek to identify the impact of artificial intelligence applications on the effectiveness of Accounting Information Systems and their relationship to big data in Jordanian commercial banks listed on the Amman Stock Exchange.

Our study highlights the importance of the role played by artificial intelligence through its applications in the field of accounting, and the presence of Accounting Information Systems commensurate with the outputs and processes that occur in a high technological environment is one of the most important elements supporting the application of artificial intelligence and its multiple technologies. the application of AI techniques in developing AIS in commercial banks leverages big data to enhance efficiency, accuracy, and decision-making capabilities. These techniques contribute to fraud detection, risk assessment, customer relationship management, cost reduction, compliance, and decision support. Harnessing AI's power enables commercial banks to stay competitive in an increasingly data-driven and technologically advanced environment. Artificial intelligence can also be used in the field of accounting in general and in the banking sector in particular, as there are not enough studies on this topic in the Jordanian environment and the results that may be reached through this study as suggestions and recommendations that will encourage other sectors to deal with artificial intelligence applications and review the effectiveness of electronic accounting information systems.

The paper is organized as follows. Section 2 provide a brief overview of previous studies in artificial intelligence and its impact on accounting information systems and their relationship to big data. Section 3 emphasize the methodology of the study. Section 4 presents and discuss the results. Finally, Section 5 concludes.

2. Review of literature and hypothesizes development

Artificial intelligence is defined as the simulation of human intelligence processes by machines, especially computer systems, and specific applications of artificial intelligence

include expert systems, natural language processing, speech recognition, and computer vision (Ertel, 2018). Artificial intelligence also refers to the simulation of human intelligence by software-coded inference (Jackson, 2019).

While artificial intelligence has been defined as the science and engineering of making intelligent machines, especially intelligent computer programs, and it is related to the similar task of using computers to understand human intelligence, artificial intelligence does not have to be limited to biologically observable methods (Akerkar, 2019).

Also, the ideal characteristic of artificial intelligence is its ability to rationalize and take actions that have the best chance of achieving a certain goal (Ransbotham et al., 2018). While a subset of artificial intelligence is machine learning, which refers to the concept that computer programs can automatically learn from and adapt to new data without the help of humans, deep learning technologies enable this automatic learning by absorbing huge amounts of unstructured data such as text, images, or video (Enholtm et al., 2022).

Therefore, the researcher believes that artificial intelligence is a scientific field concerned with building computers and machines that can think, learn, and act in a way that usually requires human intelligence or includes data beyond what humans can analyze.

The International Organization for Standardization (ISO) defines big data as a set of data that has unique characteristics such as (volume, speed, diversity, variance, validity of data...etc.), and it cannot be processed efficiently using traditional technology. Modern methods of analysis must be chosen to Take advantage of it. As (Jamal, 2018) defined big data as data that exceeds the hardware environments and software tools currently used, it requires advanced methods to process this data as it grows very increasingly.

The collection and analysis of bundles of financial statements is an important part of the accountant's job, from these data, the accountant is expected to extract nuggets of information about the health of the company and its functions. Historically, this work was performed by the accountant alone without any technical assistance. Currently, there are many computer-based tools available to help with financial analysis tasks, the most prominent of which is artificial intelligence (AI) (Wong & Valer, 2019).

Also, the purpose of artificial intelligence in accounting is to increase efficiency in basic and foundational procedures and practices in a way that ultimately leads to better business decisions. Accountants can develop advanced skills for excellence in a technology-based environment through accounting programs (Bose et al., 2023).

Although artificial intelligence is useful in almost every area of business, it has proven to be truly revolutionary in accounting. Instead of spending days combing through columns of numbers, accountants can extract the information they need with one operation. This is not only a significant time saving but also provides more targeted data (Li & Zheng, 2018).

Data is also a key component of artificial intelligence and accounting. The ability of artificial intelligence to collect, organize, analyze, and interpret digital information can make it a valuable tool for an accountant. When its capacity is fully and correctly used, artificial intelligence in accounting makes it possible for a company to build a more comprehensive accounting strategy, one that can be built on bookkeeping and financial accessibility more efficiently (Mohammad et al., 2020).

Artificial intelligence in accounting also enables the acquisition of experience in accounting principles and the necessary skills to experience the profession at its most innovative level. Moreover, when artificial intelligence is allowed to perform primitive or time-consuming accounting tasks, it can enable professionals to stand out and take on more important work. And they can enable them to help build accounting and financial strategies that can take the organization to the next level (Ng & Alarcon, 2020).

Thus, artificial intelligence as an accounting tool is an important distinction for an accountant. Artificial intelligence is not intended to merge with the accounting department to put pressure on the human element involved in the company's financial control. Rather, it is aimed at strengthening the management's ability to provide the most accurate financial information possible. This does not make artificial intelligence a bad thing, it has to be embraced. In addition, no matter how sophisticated or fast an AI-based algorithm is, there is still no alternative to the human element when it comes to applying data-derived information in a real-world financial strategy (Lee & Tajudeen, 2020).

On the other hand, accounting information systems are defined as a structure used by a company to collect sales management processes and retrieve and report its financial statements so that they can be used by accountants, consultants, business analysts, managers, auditors of financial managers, regulators and tax agencies (shuairef and Al-Jadeed, 2019).

Whereas an accounting information system is also defined as a set of human resources, operational procedures, and information technology to achieve its functions, and this aspect requires the definition of scientific principles governing the choice of process events that should be processed in accounting because it is natural that not all economic and social phenomena are considered accounting, and when processing data they should be defined to apply principles, assumptions, accounting standards and measurement methods to convert data into information, but when it comes to output, accounting systems deal with a multi-party environment that meets the needs of those parties (Kumala et al., 2021).

Therefore, the effectiveness of electronic accounting information systems is the ability of accounting systems to achieve their goals by determining the level of quality of accounting information that characterizes them, to meet the various needs to help decision-makers inside and outside the accounting department.

The application of a computer-based electronic accounting information system with an artificial intelligence approach in companies and banks is also formed through three processes namely (e.g., Julianto et al., 2020):

- Data entry is carried out by entering the transaction data that occurred on the date of the incident into the database. So that the data is entered carefully to minimize the occurrence of data entry errors. Data entry is also concerned with timeliness, integration, and standardization in the use of account names and the identification of savings and loan interest.
- Data processing in artificial intelligence is associated with standardization and integration, and this becomes important when the entire data processing system develops according to a predetermined plan, and such data processing is carried out automatically in artificial intelligence.
- The outputs or outputs from the processing of data on transactions of companies and banks are in the form of financial reports such as cash flow data, balance sheets and differences in operating results, and this financial report is processed automatically by the system used by companies and banks and can be printed at any time by information users to make a decision.

Thus, the application of a computer-based electronic accounting information system with an artificial intelligence approach has an important role in the activities of companies and banks. And this role is similar to the ease of data entry that can only be done on one computer because the system is effectively integrated, besides, the transaction data that occurs every day can be processed automatically to produce financial reports (output) the information users need (Cazazian, 2022).

Artificial intelligence techniques play a significant role in developing accounting information systems (AIS) in commercial banks, especially in the era of big data. Here are some key points regarding their relationship:

- **Data Processing and Analysis:** AI techniques, such as machine learning and natural language processing, can handle large volumes of data generated by commercial banks. They can extract, process, and analyze financial data more efficiently and accurately than traditional methods. This enables banks to gain valuable insights from big data and make informed decisions (Bose et al. 2023).
- **Fraud Detection:** AI techniques can help identify fraudulent activities in commercial banks by analyzing patterns and anomalies in financial transactions. Machine learning algorithms can learn from historical data to detect suspicious patterns and flag potentially fraudulent activities, reducing financial risks for banks (Agustí & Orta-Pérez, 2023).
- **Risk Management:** AI techniques can assist in assessing and managing risks in commercial banks. By analyzing historical data and market trends, AI models can predict potential risks and provide early warnings to bank management. This helps banks make proactive decisions to mitigate risks and improve overall risk management strategies (Qasim & Kharbat, 2020).
- **Automation of Routine Tasks:** AI techniques can automate repetitive and time-consuming tasks in accounting processes, such as data entry, reconciliation, and financial reporting. This reduces the chances of human errors and frees up accounting professionals to focus on more strategic and value-added activities (Gusc et al. 2022).
- **Decision Support:** AI techniques can provide decision support to bank management by analyzing financial data and generating insights. For example, AI models can analyze customer data to identify cross-selling opportunities or predict customer churn. This helps banks in making data-driven decisions to improve customer satisfaction and profitability (Berdiyeva et al., 2021).

Overall, the integration of AI techniques in accounting information systems of commercial banks enhances data processing, analysis, fraud detection, risk management, and decision-making capabilities. It enables banks to leverage big data effectively and gain a competitive advantage in the financial industry.

Based on this review of literature, the hypothesizes that the study will examine can be formulated as follows:

H01: there is no statistically significant effect at the level of significance ($0.05 \geq \alpha$) of artificial intelligence applications on the effectiveness of Accounting Information Systems in Jordanian commercial banks listed on the Amman Stock Exchange.

H02: there is no relationship between artificial intelligence applications and the effectiveness of accounting information systems in Jordanian commercial banks listed on the Amman Stock Exchange.

H03: there is no relationship between artificial intelligence applications and big data in Jordanian commercial banks listed on the Amman Stock Exchange.

H04: there is no relationship between the effectiveness of accounting information systems and big data in Jordanian commercial banks listed on the Amman Stock Exchange.

3. Data and Methodology

In this study, we use the descriptive and regressions approaches to examin the role of artificial intelligence techniques in developing accounting information systems and their

relationship to big data. We also provide important recommendations to decision-makers in the relevant sectors.

Data is collected by interviewing a sample of accountants and managers in Jordanian commercial banks and distributing the questionnaire to them. The sample of the study consists of all Jordanian commercial banks, the number of these banks is about (12), and the number of accountants and managers in these commercial banks is about (983) employees, and the sample size of the study is (300) questionnaires, 30.1% of the number of employees in all these banks. We use SPSS version 27 to perform regression analysis and correlation tests.

4. Results and discussion

This part of the study reviews all the results of statistical methods and tests of the study data so that they contain a comprehensive description of the relevant characteristics of the study sample. It also explains the tools used in the study, such as the stability test, the tests of relevance of the study data, as well as the testing of hypotheses associated with the study model, and comments on these results related to the study. The following are the most important of these tests:

4.1 Stability test (Reliability):

The Cronbach's alpha coefficient test (Cronbach's alpha) was carried out to test the stability of the study, and according to this test theoretically, the higher the Cronbach's coefficient alpha test is above (0.700), this means the stability of the study instrument (Sekaran, 2006). Table 1 shows the results of the reliability test.

Table 1: Results of the reliability test

Variables	number of paragraphs	Cronbach's coefficient Alpha
Artificial Intelligence (AI)	10	0.817
Effectiveness of Accounting Information Systems (EAUC)	15	0.831
Big Data (BD)	10	0.804

Source: these results were extracted through the statistical program (SPSS.27).

The results showed that the values of Cronbach's alpha coefficient for all study variables ranged from (0.804 – 0.831) and that these values exceed the theoretically accepted ratio of the stability of the resolution, which is (0.700). These values are considered acceptable and reflect the constancy of the study's resolution.

4.2 Tests of relevance of study data:

The suitability of the data used in this study was tested to conduct linear regression analysis and tests for the coefficients of the model of this study. For this purpose, multiple linear correlation (Multicollinearity) and autocorrelation tests have been performed, and the two tests have been performed as follows:

- Multicollinearity test

The entire sample of this study was confirmed to be free of the problem of multiple correlation through the use of the Variance Inflation Coefficient (VIF) scale. Table 2 shows the results of the Variance Inflation Coefficient (VIF) test.

Table 2: multiple correlation Test

Variables	Tolerance	Variance Inflation Factor (VIF)
Artificial Intelligence (AI)	0.508	1.857
Effectiveness of Accounting	0.383	2.435

Information Systems (EAUC)		
Big Data (BD)	0.453	2.074

Source: these results were extracted through the statistical program (SPSS.27).

The results showed that all independent variables exceeded the value (1) and were less than the value (10), while the test values of the coefficient of variation inflation ranged between the value (0.1) and less than the value (1). this result indicates that all independent variables used in the study are free from the problem of multiple linear correlation.

- Autocorrelation

To ensure that all the data and hypotheses of the study are free from the problem of self-correlation, this is done through the use of the Durbin-Watson test, and the values of this test range between the value (0) and less than the value (4). according to the theory of this test, the existence of the problem of self-correlation of the study data and hypotheses is rejected if the values from this test are equal to (2) or close to this value. Table 3 presents the results of the Darben Watson test for all the hypotheses of the study.

Table 3: Results of the autocorrelation test

Hypothesis	Darben Watson test	result
H₀₁	1.917	There is no Autocorrelation
H₀₂	1.962	There is no Autocorrelation
H₀₃	1.893	There is no Autocorrelation
H₀₄	1.946	There is no Autocorrelation

Source: these results were extracted through the statistical program (SPSS.27).

The results of the Durbin-Watson test indicate that all the variable values for all the study hypotheses were close to (2), and this indicates that all the study data are free from the problem of self-correlation, and there is no correlation between the random error in the regression model of this study.

- Normality Test

The normal distribution test is performed by extracting the Kurtosis and Skewness coefficients for all study variables, and Table 4 displays results of the normal distribution test.

Table 4: Results of the normal distribution test

Variables	kurtosis	Skewness
Artificial Intelligence (AI)	-0.726	-0.123
Effectiveness of Accounting Information Systems (EAUC)	-0.457	-0.360
Big Data (BD)	-0.121	-0.415

Source: these results were extracted through the statistical program (SPSS.27).

The results of the normal distribution test showed that all values of the Kurtosis and Skewness test coefficients for all study variables are less than (2) and close to zero and this indicates that all study data follow a normal distribution. Still, based on the theory of central tendency, which states that if the sample size is greater than (30) and has an arithmetic mean (μ) and a variance (σ^2), then the sampling distribution of the arithmetic mean approaches the normal distribution.

4.3. Demographic characteristics of the study sample:

In this part, we present a descriptive statement of demographic information for the study sample namely gender, age, educational qualification and job experience.

We find that the percentage of males among accountants and managers in commercial banks listed on the ASE for the study sample is the highest, reaching about (64%), while the percentage of females reached about (34%) of the total target study sample.

The results showed that (27%) of the total study sample ranged in age from (30-39 years), while (20%) of the total study sample ranged in age from (40-49 years), and 10% of the total study sample ranged in age from (50 years). It is worth mentioning that the largest percentage of the study sample was in the age group (20-29 years) at (43%) of the total study sample.

The results also showed that (54%) of the total study sample hold a bachelor's degree, while (36%) of the sample hold a diploma, (10%) of the total study sample hold a graduate degree.

The results showed that (24.8%) of the total study sample have years of experience ranging from (11 years - 15 years), while (23.7%) of the total study sample have years of experience ranging from (16 years - 20 years), and (8.4%) of the total study sample has years of experience more than 20 years, and it is clear that the largest percentage of the study sample was years of experience ranging from (5 years to 10 years), which represents (43.1%) of the total study sample.

4.4. Results of the study hypotheses

In this section, we present the regression results of testing the different hypotheses. Table 5 present results for testing our first hypothesis.

Table 5: Results of the study model test

dependent variable	Model summary		ANOVA			Table of transactions				
	R	R ²	F	Df	Sig	Items	B	Stand. error	T	Sig.
Effectiveness of Accounting Information Systems (EAUC)	0.569	0.324	99.781	1	0.00	α	1.891	0.202	9.360	0.00*
				254		Artificial Intelligence (AI)	0.513	0.051	9.989	0.00*
				255						

Source: these results were extracted through the statistical program (SPSS.27).

*. There is a statistically significant effect at the level of ($\alpha \geq 0.05$).

We note from the above table that the correlation coefficient reached about ($R = 0.569$) and this indicates that the relationship between the independent variables and the dependent variable is strong, while the calculated value of F reached about (99.781), which is statistically significant at a significant level (0.05). Still, the value of the coefficient of determination showed ($R^2 = 0.324$) and this indicates that (32.4%) of the variation in the effectiveness of accounting information systems) can be explained by the variation in artificial intelligence.

Table 5 show that all the parameters of the study model are statistically significant and significant at the level of (0.05). Based on this finding, we reject the nihilistic hypothesis and accept the alternative hypothesis that states that there is statistically significant effect at the level of significance ($0.05 \geq \alpha$) of artificial intelligence applications on the effectiveness of Accounting Information Systems in Jordanian commercial banks listed on the Amman Stock Exchange.

We can now write the typical equation as follows:

$$EAUC_{it} = 1.891 + 0.513 AI_{it} \quad (1)$$

The results of testing the other hypothesis of this study are presented in Table 6.

Table 6: Pearson correlation matrix

	Artificial Intelligence (AI)	Effectiveness of Accounting Information Systems (EAUC)	Big Data (BD)
Artificial Intelligence (AI)	1		
Effectiveness of Accounting Information Systems (EAUC)	0.569*	1	
Big Data (BD)	0.628*	0.714*	1

Source: these results were extracted through the statistical program (SPSS.27).

(*) There is a correlation at the significance level of 0.05

The results of testing the hypothesis H02 are presented in Table (6). The findings show that the relationship between artificial intelligence applications and the effectiveness of accounting information systems is (0.569), which is statistically significant at the level of (0.05). Based on the above, we reject the nihilistic hypothesis and accept the alternative hypothesis that states that there is a relationship between artificial intelligence applications and the effectiveness of accounting information systems in Jordanian commercial banks listed on the Amman Stock Exchange.

Table 6 also present the results of testing the hypothesis (H03). We find that the relationship between artificial intelligence applications and big data is about (0.628) and is statistically significant at the level of (0.05). Hence, we reject the nihilistic hypothesis and accept the alternative hypothesis that states that there is a significant relationship between artificial intelligence applications and big data in Jordanian commercial banks listed on the Amman Stock Exchange”.

Finally, we present the results of testing this hypothesis (H04) in Table 6. Results show that the relationship between the effectiveness of accounting information systems and big data is about 0.714 and is statistically significant at the level of (0.05).

Based on the above, we reject the nihilistic hypothesis and accept the alternative hypothesis that states that There is a relationship between the effectiveness of accounting information systems and big data in Jordanian commercial banks listed on the Amman Stock Exchange.

Our study show that the accounting use of information technology tools helps to improve and increase the accuracy of accounting work and increases the quality of its outputs. Indeed, the use of artificial intelligence applications in accounting activity leads to the development of procedural and conceptual frameworks for the accounting profession at the level of the internal and external environment and occupies an important position at the level of the operational and strategic parts and levels of the organization in terms of contributing to the process of integration and parity between the internal environment and the external environment.

In addition, the existence of a link between artificial intelligence methods, big data, and the effectiveness of accounting systems provides a highly competitive advantage for banks if they can benefit from and process them because they provide a deeper understanding of their customers and their requirements, and this helps them make appropriate decisions more effectively, based on the information extracted from. The use of artificial intelligence is also considered one of the necessary matters in the world of business because of the need to keep pace with developments that have required the external environment to keep pace and integrate with it, and to benefit from the positives provided by technological progress in all aspects and fields.

The accounting use of information technology tools also helps to improve and increase the accuracy of accounting work and increases the quality of its outputs. The use of artificial intelligence applications in accounting activity leads to the development of

procedural and conceptual frameworks for the accounting profession at the level of the internal and external environment and occupies an important position at the level of the operational and strategic parts and levels of the organization in terms of contributing to the process of integration and parity between the internal environment and the external environment.

5. Conclusion

Our study highlights the existence of a link between artificial intelligence methods, big data, and the effectiveness of accounting systems. Hence, artificial intelligence provides a highly competitive advantage for banks if they can benefit from and process them because they provide a deeper understanding of their customers and their requirements, and this helps them make appropriate decisions more effectively, based on the information extracted from. Prepare data thus increasing efficiency. The use of artificial intelligence is also considered one of the necessary matters in the world of business because of the need to keep pace with developments that have required the external environment to keep pace and integrate with it, and to benefit from the positives provided by technological progress in all aspects and fields.

Therefore, the study presents several recommendations. Indeed, banks must work to spread the culture of applying artificial intelligence to analyze big data to benefit from it in increasing efficiency and productivity and reducing losses. Still, modern technological must be used to deal with the huge data available on various databases, with the possibility of sharing this data. Especially, the spread of electronic financial services must be supported using Internet networks and the provision of financial services at any time and from any place by allowing every customer to access and benefit from his data and financial services at any time and from any place. Finally, data mining must be used to develop procedural and conceptual frameworks for the profession of accounting.

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