

The Impact of Artificial Intelligence on the Accounting Information Systems in Jordanian Commercial Banks

Maamoun Kareem¹, Dorsaf Ben Aissia²

Abstract

This study aims to identify the impact of artificial intelligence on the effectiveness of Accounting Information Systems in Jordanian commercial banks listed on the Amman Stock Exchange. The sample size of the study is (256) questionnaires, 30% of the number of employees in all these banks.

The results of the study show that there is a significant impact of the different dimensions of artificial intelligence (machine learning, deep learning, natural language processing, and computer vision) on the effectiveness of Accounting Information Systems in Jordanian commercial banks listed on the Amman Stock Exchange. These results shed light that AI technologies have improved efficiency, accuracy, and risk management capabilities while enabling banks to allocate resources more strategically. As technology continues to advance, artificial intelligence is expected to play a greater role in shaping the future of accounting information systems within commercial banking organizations.

Keywords: *machine learning, effectiveness of Computer Information Systems, artificial intelligence, commercial banks.*

1. Introduction

In the last two decades have, we have assisted in the emergence 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.

One of the main effects of artificial intelligence on accounting systems is to increase the accuracy and speed of information processing and automate repetitive tasks such as data entry and settlement, which improves the efficiency and accuracy of accounting operations. By analyzing large amounts of financial data in real-time, AI-powered systems can identify patterns, anomalies, and trends that may go unnoticed by accountants. This can help banks detect fraud or financial irregularities more effectively.

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.

¹ PhD in Accounting from the University of Manouba

² Professor of Finance, Higher Institute of Accounting and Business Administration

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

Therefore, this study seeks to identify the impact of artificial intelligence applications through (machine learning, deep learning, natural language processing, and computer vision) on the effectiveness of Accounting Information Systems in Jordanian commercial banks listed on the Amman Stock Exchange. The importance of this study also lies in 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. 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 provides a brief overview of previous studies in artificial intelligence and its impact on accounting information systems and their relationship to big data. It presents also hypotheses development. Section 3 emphasizes the data and methodology of the study. Section 4 presents and discusses the results. Finally, Section 5 concludes.

2. Previous studies and hypothesizes development

Many studies have been conducted on the subject of artificial intelligence and accounting information systems, and these studies have used many statistical and theoretical methods to estimate the impact of artificial intelligence on accounting information systems in commercial banks. The following is a review of the most important Arab and foreign studies that have a strong relationship to the purpose of the study.

Salameh & Lutfi, (2021) conducted a study to find out the role of artificial intelligence applications in reducing cybercrimes in Jordanian commercial banks. the study was conducted on (13) Jordanian commercial banks listed on the Amman financial market. a questionnaire was designed and distributed to the study sample. the statistical program (SPSS) was used to analyze the questionnaire and test its hypotheses. The study also found a statistically significant impact of artificial intelligence with its dimensions (expert systems, artificial neural network, genetic algorithm, and fuzzy logic) in reducing cybercrime in Jordanian commercial banks.

Still, Berdiyeva et al., (2021) conducted a study on " artificial intelligence in accounting and finance: adopting artificial intelligence applications such as expert systems for audit and taxation, intelligent agents for customer service, and machine learning for decision-making, which leads to a great benefit by reducing errors and increasing the efficiency and transparency of accounting and financial processes, this study adopted the theoretical comparison methodology of several previous studies, comparing their results and reaching conclusions. The study reached several conclusions, including that the future of the accounting and finance profession depends entirely on artificial intelligence to provide these professionals with the resources they need to improve their work productivity and efficiency.

In addition, Al-Shatnawi et al., (2020) also conducted a study to test the impact of using artificial intelligence applications in improving the quality of accounting information in Jordanian Public Joint Stock Companies. The results of the study showed that there is a statistically significant moral impact of the use of artificial intelligence applications in the

appropriateness of accounting information, truthful representation of accounting information, verifiability of accounting information, and the timeliness of accounting information in Jordanian Public Joint Stock Companies. Still, Al-Jaber, (2020) focused on identifying the impact of artificial intelligence in its dimensions (expert systems, knowledge representation and inference, automatic learning) on the efficiency of accounting systems in its dimensions (integration of the accounting system, interconnection of the Accounting Information System, accuracy of accounting works, quality of interpretation of accounting information, quality of presentation of accounting information) in Jordanian banks. Where it relied on the descriptive and evidentiary method to fit them with the purposes of the study. The study community consisted of all employees in the financial Department of Jordanian banks, where the results showed the impact of the use of artificial intelligence on the efficiency of accounting systems in Jordanian banks.

Buzrab and Sahnoun, (2019) also conducted an analysis of the reality of the application of artificial intelligence in the Indian banking sector, and the results showed that the application of artificial intelligence in the banking sector has many advantages, including increasing worker satisfaction, earning their loyalty, and reducing costs. The application of artificial intelligence also contributes to reducing the negative aspects associated with banking work, such as cases of fraud, money laundering and the disappearance of human errors, and the results also showed that several determinants prevent the application of artificial intelligence, unemployment is one of the most important.

Dahlaha et al., (2019) examined the impact of artificial intelligence applications on the performance of the accounting profession in Jordan, and the results of the study showed that there is a significant impact of artificial intelligence applications on the accounting profession with an arithmetic average of 4.7 and a standard deviation of 0.69 and a percentage of 87.2% and a very high approval rate, from the point of view of Jordanian Chartered Accountants, based on the results of hypothesis testing, the nihilistic study hypotheses were rejected and alternative hypotheses were accepted.

Askary et al., (2018), on testing the impact of the use of artificial intelligence on the reliability of financial statements, the study community consisted of British industrial companies, and descriptive statistical methods were used. The study found a significant link between reliability in the accounting profession and its outputs through the development of the concept of the quality of profits and the appropriateness of accounting information, the strength of the internal control system and its integrity, therefore, the integration of artificial intelligence applications in internal control systems may help the accounting system to produce high-quality financial outputs and reports, and in turn also reduce the risks of profit management as a reflection of reducing the role or control of managers during the preparation period.

Therefore, the current study is characterized by its focus on intelligent systems that deal with large-scale computerized data, which in turn may improve the performance of archiving and operations, and also help reduce cost and time, and the current study measures the impact of using basic artificial intelligence applications on the effectiveness of Accounting Information Systems. The current study is also distinguished by its treatment of the banking sector, as the Jordanian banking sector is considered the most important Jordanian economic sector for several reasons, as the banking sector is one of the main sectors supporting the Jordanian national income, and it also plays an important role in supporting economic development.

Based on the problem of the study and its questions and to achieve its goals, the hypotheses that the study will examine can be formulated as follows:

The main hypothesis (H_0): 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.

The following sub-hypotheses branch off from the main hypothesis:

The first sub-main hypothesis (H_{0-1}): there is no statistically significant effect at the significance level ($0.05 \geq \alpha$) of machine learning on the effectiveness of accounting systems in Jordanian commercial banks listed on the Amman Stock Exchange.

The second sub-main hypothesis (H_{0-2}): there is no statistically significant effect at the level of significance ($0.05 \geq \alpha$) of deep learning on the effectiveness of accounting systems in Jordanian commercial banks listed on the Amman Stock Exchange.

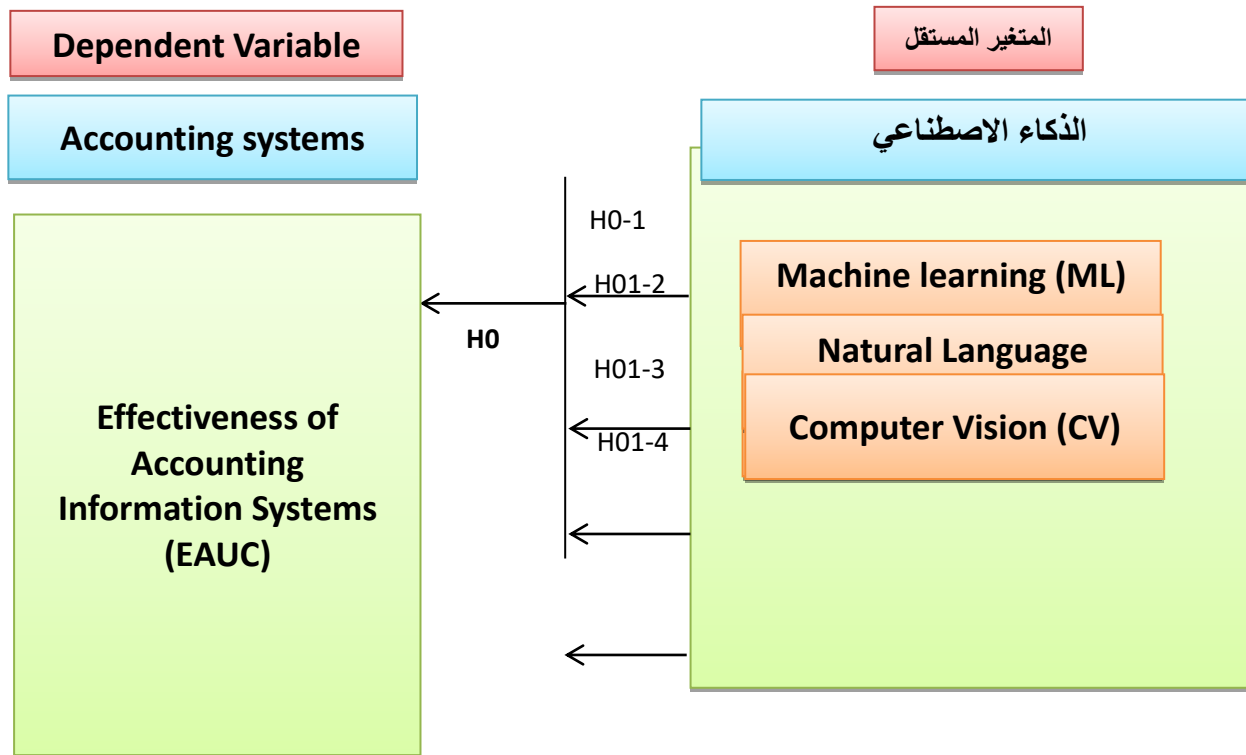
The third sub-main hypothesis (H_{0-3}): there is no statistically significant effect at the level of significance ($0.05 \geq \alpha$) natural language processing, on the effectiveness of accounting systems in Jordanian commercial banks listed on the Amman Stock Exchange.

The fourth sub-main hypothesis (H_{0-4}): there is no statistically significant effect at the significance level ($0.05 \geq \alpha$) of computer vision on the effectiveness of accounting systems in Jordanian commercial banks listed on the Amman Stock Exchange.

3. Data and Methodology

In this study, the researcher relied on the descriptive analytical approach in dealing with the subject of the study to reach the results related to it and provide the most important recommendations to decision-makers in the relevant sectors. The data will be 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 (853) employees, and the sample size of the study is (256) questionnaires, 30% of the number of employees in all these banks. Also, in this study, SPSS version 27 will be used to perform multiple regression analysis to test the impact of the following key independent variables of artificial intelligence (machine learning, deep learning, natural language processing, computer vision) and their impact on the effectiveness of Accounting Information Systems.

Figure 1: Study of the model



Source: a model was constructed using the following Studies: a study (al-Jaber, 2020), a study (Cazazian, 2022) a study (Julianto et al., 2020), and a study (Alsmadi et al., 2023).

The study model can be written as a standard statistical equation as follows:

$$EAUC_{it} = \alpha_i + \beta_1 ML_{it} + \beta_2 DL_{it} + \beta_3 NLP_{it} + \beta_4 CV_{it} + \varepsilon_{it} \quad (1)$$

Where:

EAUC_{it}: the effectiveness of Accounting Information Systems.

ML_{it}: machine learning.

DL_{it}: deep learning.

NLP_{it}: natural language processing.

CV_{it}: computer vision.

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
Machine learning (ML)	6	0.809
Deep learning (DL)	6	0.812
Natural Language Processing (NLP)	6	0.819
Computer vision (CV)	6	0.830
Effectiveness of Accounting Information Systems (EAUC)	10	0.842

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 (0.809 – 0.842) 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

This test is used to make sure that there is no almost complete linear correlation between two or more independent variables so that this correlation leads to amplifying the value of the interpretation coefficient (R2) to a level greater than the actual value of this coefficient. This test is performed by measuring the Pearson correlation coefficient, and the value of the coefficient of variation inflation (VIF) is calculated for each variable based on the study hypotheses. The results of these two tests are as follows:

Table 2: Pearson correlation matrix for independent variables

	Machine learning (ML)	Deep learning (DL)	Natural Language Processing (NLP)	Computer vision (CV)
Machine learning (ML)	1			
Deep learning (DL)	0.667*	1		
Natural Language Processing (NLP)	0.764*	0.623*	1	
Computer vision (CV)	0.679*	0.374*	0.458*	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 showed that the Pearson correlation coefficients of all independent variables ranged between the values (0.374-0.764), and since these values are less than (0.800), this indicates that there is no multiple linear correlation between all independent variables.

In addition, 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, and Table 3 shows the results of the Variance Inflation Coefficient (VIF) test.

Table 3: multiple correlation Test between independent variables

Variables	Tolerance	Variance Inflation Factor (VIF)
Machine learning (ML)	0.508	1.857
Deep learning (DL)	0.383	2.435
Natural Language Processing (NLP)	0.453	2.074
Computer vision (CV)	0.458	2.038

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 4 shows the results of the Darben Watson test for all the hypotheses of the study.

Table 4: Results of the autocorrelation test

Hypothesis	Darben Watson test	result
H ₀	1.917	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 No. 5 shows the results of the normal distribution test.

Table 5: Results of the normal distribution test

Variables	kurtosis	Skewness
Machine learning (ML)	-0.701	-0.098
Deep learning (DL)	-0.432	-0.335
Natural Language Processing (NLP)	-0.096	-0.390
Computer vision (CV)	-0.491	-0.092
Effectiveness of Accounting Information Systems (EAUC)	-0.933	-0.140

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. And also 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, a descriptive statement of demographic information was made for all members of the study sample: (gender, age, educational qualification, job experience). The following is a summary of the descriptive statistical results of the demographic characteristics of the study sample:

- The percentage of males among accountants and managers in commercial banks listed on the ASE for the study sample is the highest, reaching about (66.1%), while the percentage of females reached about (33.9%) of the total target study sample.
- The results showed that (28.5%) of the total study sample ranged in age from (30-to 39 years), while (19.3%) of the total study sample ranged in age from (40-49 years), and 9.3% 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 42.9% of the total study sample.
- The results showed that (56.8%) of the total study sample hold a bachelor's degree, while (34.6%) of the sample hold a diploma, (8.6%) of the total study sample hold a graduate degree, and this indicates that Jordanian commercial banks focus on hiring university degree holders (Bachelor), as confirmed by the official statistics issued by the Association of banks in Jordan in its annual report for the year 2022, so that the percentage of diploma and Bachelor holders is about (82%) of the total employees in Jordanian commercial banks.
- The results showed that (26.1%) of the total study sample have years of experience ranging from (11 years - 15 years), while (21.5%) of the total study sample have years of experience ranging from (16 years - 20 years), and (9.4%) 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%) of the total study sample.

4.4. Results of the study hypotheses

In this part, the results of the hypothesis testing related to the study model will be reviewed, and the results can be explained as follows:

Table 6: 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)	0.704	0.479	50.404	4	0.00	α	1.507	0.226	6.366	0.01*
				251		Machine learning (ML)	0.462	0.068	5.903	0.00*
				255		Deep learning (DL)	0.175	0.054	2.816	0.03*
						Natural Language Processing (NLP)	0.272	0.047	4.776	0.00*

						Computer vision (CV)	0.282	0.056	4.303	0.01*
--	--	--	--	--	--	----------------------	-------	-------	-------	-------

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

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

It is noted from the above table that the correlation coefficient reached about ($R = 0.704$) and this indicates that the relationship between the independent variables and the dependent variable is strong, while the calculated value of F reached about (50.404), which statistically significant at a significant level (0.05), while the value of the coefficient of determination showed ($R^2 = 0.479$) and this indicates that (47.9%) of the variation in (the effectiveness of accounting information systems) can be explained by the variation in the dimensions of artificial intelligence (machine learning, learning deep, natural language processing, computer vision). The results of testing the hypotheses of this study can be stated as follows:

The main hypothesis (Ho): "There is no statistically significant impact 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".

The results of testing this hypothesis in Table No. (6) showed that all the parameters of the study model (machine learning, deep learning, natural language processing, computer vision) are statistically significant and significant at the level of (0.05).

Based on the above, we reject the nihilistic hypothesis and accept the alternative hypothesis that states:

"There is a statistically significant impact 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 write the typical equation as follows:

$$EAUC_{it} = 1.507 + 0.462 ML_{it} + 0.175 DL_{it} - 0.275 NLP_{it} + 0.282 CV_{it} \quad (2)$$

The results of testing this hypothesis in Table 6 showed that the coefficients of the variable (machine learning) have reached the value of $B = 0.462$, with a standard error = 0.068, and the calculated value (t) = 5.903, which is statistically significant and 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 statistically significant impact at the significance level ($0.05 \geq \alpha$) of machine learning on the effectiveness of accounting systems in Jordanian commercial banks listed on the Amman Stock Exchange.

The results of testing this hypothesis in Table 6 showed that the coefficients of the variable (for deep learning) have reached the value of $B = 0.175$, with a standard error = 0.054, and the calculated value (t) = 2.816, which is statistically significant and significant at the level of (0.05).

Hence, reject the nihilistic hypothesis, and accept the alternative hypothesis that states that there is a statistically significant impact at the level of significance ($0.05 \geq \alpha$) of deep learning on the effectiveness of accounting systems in Jordanian commercial banks listed on the Amman Stock Exchange.

The results of testing this hypothesis in Table 6 showed that the coefficients of the variable (natural language processing) have reached the value of $B = 0.275$, with a standard error = 0.047, and the calculated value (t) = 4.776, which is statistically significant and significant at the level of (0.05). Therefore, we accept the alternative

hypothesis that states that there is a statistically significant impact at the level of significance ($0.05 \geq \alpha$) of natural language processing, on the effectiveness of accounting systems in Jordanian commercial banks listed on the Amman Stock Exchange.

Finally, the results of testing this hypothesis in Table 6 showed that the coefficients of the variable (computer vision) have reached the value of $B = 0.282$, with a standard error = 0.056, and the calculated value (t) = 4.303, which is statistically significant and significant at the level of (0.05). Hence, we reject the nihilistic hypothesis and accept the alternative hypothesis that states that There is a statistically significant impact at the significance level ($0.05 \geq \alpha$) of computer vision, on the effectiveness of accounting systems in Jordanian commercial banks listed on the Amman Stock Exchange.

Our study highlights that the use of artificial intelligence applications has revolutionized the way accounting information systems work in commercial banks. These advanced technologies have enhanced efficiency, accuracy, and reliability by automating repetitive tasks and reducing human errors. AI-powered algorithms can analyze huge amounts of financial data with exceptional speed and accuracy, enabling banks to make informed decisions based on real-time insights.

Furthermore, we find that AI applications have improved risk management within accounting information systems. Machine learning algorithms can also detect anomalies and patterns that may indicate fraudulent activities or potential risks. This proactive approach enables banks to immediately mitigate risks and protect their financial assets.

5. Conclusion

Our study shed light that AI applications have simplified processes such as data entry, reconciliation, and reporting in Accounting Information Systems. By automating these tasks, commercial banks can allocate resources more effectively and focus on higher-value activities such as financial analysis and strategic decision-making.

We conclude that the integration of artificial intelligence applications has had a transformative impact on the effectiveness of Accounting Information Systems in commercial banks. These technologies have improved efficiency, accuracy, and risk management capabilities while enabling banks to allocate resources more strategically. As technology continues to advance, artificial intelligence is expected to play a greater role in shaping the future of accounting information systems within commercial banking organizations.

References

- Akerkar, R. (2019). *Artificial intelligence for business*. Springer.
- Al-dalahme, Suleiman Mustafa, al-Qadi, fares Saud and Al-Aman, Nayef Raji (2019). The impact of artificial intelligence applications on the accounting profession is a descriptive study of the type of survey. Tenth scientific conference, entitled: Artificial Intelligence and economic development, for the period April 15-17, Faculty of Business, Jerash University, Jerash, Jordan, pp. 81-89.
- Al-Jaber, Ghadeer Mohammed Ouda (2020). The impact of artificial intelligence on the efficiency of accounting systems in Jordanian banks. Unpublished master's thesis, Middle East University, Amman, Jordan.
- Al-Shatnawi, Hassan Mahmoud, al-Atoum, Mohammed Salem and Abu al-hija, Hamad Adnan (2020). The impact of the use of artificial intelligence applications in improving the quality of accounting information in Jordanian Public Joint Stock Companies. Tenth scientific conference, entitled: Artificial Intelligence and economic development, for the period April 15-17, Faculty of Business, Jerash University, Jerash, Jordan, pp. 49-65.

- Askary Noor, N. & Mansor, N. (2019). Exploring the adaptation of artificial intelligence in the whistleblowing practice of the internal auditors in Malaysia. *Procedia Computer Science*, 163, 434-439.
- Berdiyeva, O., Islam, M. U., & Saeedi, M. (2021). Artificial Intelligence in Accounting and Finance: Meta-Analysis. *NUST Business Review*, 3 (1), 56-79.
- Bose, S., Dey, S. K., & Bhattacharjee, S. (2023). Big data, data analytics and artificial intelligence in accounting: An overview. *Handbook of Big Data Research Methods*: 0, 32.
- Bozrab, Khairuddin and sahnoun, Heba (2019). Artificial intelligence and its applications in the banking sector: a reading in the Indian experience with the HDFC Bank case study"). A book entitled: Artificial Intelligence Applications as a Modern Trend to enhance the Competitiveness of business organizations, Arab Democratic Center for Strategic, political and Economic Studies, Berlin, Germany, first edition.
- Canhoto, A. I., & Clear, F. (2020). Artificial intelligence and machine learning as business tools: A framework for diagnosing value destruction potential. *Business Horizons*, 63(2), 183-193.
- Cazazian, R. (2022). Blockchain Technology Adoption in Artificial Intelligence-based Digital Financial Services, Accounting Information Systems, and Audit Quality Control. *Review of Contemporary Philosophy*, (21), 55-71.
- Deng, L., & Liu, Y. (Eds.). (2018). *Deep learning in natural language processing*. Springer.
- Enhalm, I. M., Papagiannidis, E., Mikalef, P., & Krogstie, J. (2022). Artificial intelligence and business value: A literature review. *Information Systems Frontiers*, 24(5), 1709-1734.
- Ertel, W. (2018). *Introduction to artificial intelligence*. Springer.
- Esteva, A., Chou, K., Yeung, S., Naik, N., Madani, A., Mottaghi, A., ... & Socher, R. (2021). Deep learning-enabled medical computer vision. *NPJ digital medicine*, 4(1), 5.
- Hasan, A. R. (2021). Artificial Intelligence (AI) in accounting & auditing: A Literature review. *Open Journal of Business and Management*, 10(1), 440-465.
- Hossin, A. M., & Ayedh, A. M. (2016). The risks of electronic accounting information system in the Central Bank of Libya. *South East Asian Journal of Contemporary Business, Economics and Law*.
- Jackson, P. C. (2019). *Introduction to artificial intelligence*. Courier Dover Publications.
- Janiesch, C., Zschech, P., & Heinrich, K. (2021). Machine learning and deep learning. *Electronic Markets*, 31(3), 685-695.
- Julianto, I. P., Pasek, N. S., & Wiguna, I. G. N. H. (2020, December). The Effectiveness of the Application of Artificial Intelligence-Based Accounting Information Systems at SMEs in Singaraja. In *5th International Conference on Tourism, Economics, Accounting, Management and Social Science (TEAMS 2020)* (pp. 212-222). Atlantis Press.
- Kakani, V., Nguyen, V. H., Kumar, B. P., Kim, H., & Pasupuleti, V. R. (2020). A critical review on computer vision and artificial intelligence in the food industry. *Journal of Agriculture and Food Research*, 2, 100033.
- Kang, Y., Cai, Z., Tan, C. W., Huang, Q., & Liu, H. (2020). Natural language processing (NLP) in management research: A literature review. *Journal of Management Analytics*, 7(2), 139-172.
- Kumala, D., Mangruwa, R. D., & Dewi, E. P. (2021, September). Technology acceptance model for adopting e-accounting information system based on open source for SMEs. In *2021 International Seminar on Application for Technology of Information and Communication (iSemantic)* (pp. 263-267). IEEE.
- Lee, C. S., & Tajudeen, F. P. (2020). Usage and impact of artificial intelligence on accounting: Evidence from Malaysian organizations. *Asian Journal of Business and Accounting*, 13(1).
- Li, B., & Xu, Z. (2021). Insights into financial technology (FinTech): a bibliometric and visual study. *Financial innovation*, 7, 1-28.

- Mohammad, S. J., Hamad, A. K., Borgi, H., Thu, P. A., Sial, M. S., & Alhadidi, A. A. (2020). How artificial intelligence changes the future of the accounting industry. *International Journal of Economics and Business Administration*, 8(3), 478-488.
- Ng, C., & Alarcon, J. (2020). *Artificial intelligence in accounting: Practical applications*. Routledge.
- Patrício, D. I., & Rieder, R. (2018). Computer vision and artificial intelligence in precision agriculture for grain crops: A systematic review. *Computers and electronics in agriculture*, 153, 69-81.
- Ransbotham, S., Gerbert, P., Reeves, M., Kiron, D., & Spira, M. (2018). Artificial intelligence in business gets real. *MIT Sloan management review*.
- Salameh, R. & Lutfi, K. (2021). The role of artificial intelligence in limiting Jordanian commercial banks' cybercrimes. *Accounting*, 7(5), 1147-1156.
- Salim, Ibrahim Muhammad Ali and Abbas, Fadel (2020). The impact of electronic accounting information systems in supporting the performance of the internal auditor by applying to banks operating in Duhok Governorate. *Journal of Baghdad University of Economic Sciences*, Volume (1), Issue (1).
- Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill building approach*. New York: John Wiley & Sons.
- Sheweref, Abdullah Miftah and Al-Jadeed, Mukhtar Mohammed. (2019). Electronic accounting information systems and their role in achieving entrepreneurship.