The Impact of Cloud-Based Enterprise Resource Planning System on Blockchain Adoption, with the Presence of Cloud Auditing as an Intermediary Variable in Jordanian Commercial Banks

Ala' Rabie[1], Osamah Abdul-Munim Ali[2*], Hani Al-Rawashdeh[3], Hebah Rabie[4]

Abstract

The study aimed to determine the impact of a cloud-based Enterprise Resource Planning (ERP) system on the adoption of blockchain technology, with the presence of cloud auditing as an intermediary variable, in Jordanian commercial banks. The study utilized a descriptive-analytical approach to describe and analyze the phenomenon under investigation, which revolves around cloud-based ERP systems and their influence on blockchain technology adoption, along with the mediating role of cloud auditing. The study's population consisted of Jordanian commercial banks listed on the Amman Stock Exchange, with a total of 12 banks by the end of the year 2022. The study utilized the Statistical Package for Social Sciences (SPSS) and Amos software to analyze the study's questionnaire. The study yielded several key findings, one of which is the presence of an impact of cloud-based Enterprise Resource Planning (ERP) systems on the adoption of blockchain technology, mediated by cloud auditing, in Jordanian commercial banks. As for the study's recommendations, they emphasize the necessity for Jordanian commercial banks to provide appropriate training and awareness programs for their auditing teams regarding cloud auditing. This initiative aims to enhance their understanding of cloud technologies, associated tools, and cloud auditing skills. Furthermore, it's important for these banks to fulfill all requirements and procedures ensuring compliance with laws and regulations related to financial technology and blockchain.

Keywords: *Cloud-based ERP system, blockchain, cloud auditing, Jordanian commercial banks.*

Introduction

Enterprise Resource Planning (ERP) systems are technological tools used for managing blockchain operations in banks (Acar et al., 2020). They represent robust business packages that facilitate complex functions, integrate departments, and manage resources (Chaudhari, 2020). The significance of these systems lies in their ability to bring about radical changes in organizational computing within banks by simplifying integrated planning and customer responses. They provide means to manage and monitor data, information, and materials (Migdadi & Abu Zaid, 2016). Cloud-based ERP systems combine the benefits of standard ERP planning with enhanced flexibility and the cost advantages of cloud services. They assist in achieving higher levels of sustainable performance by improving financial processes, enhancing information quality, supporting decision-making, and improving cloud auditing quality. This, in turn, enhances banks'

---

[1] Jerash university, Faculty of Business, Accounting department, Jerash Jordan, rabeiala008@gmail.com
[2] Jerash university, Faculty of Business, Accounting department, Jerash Jordan, al_osama@yahoo.com
[3] Jerash university, Faculty of Business, Accounting department, Jerash Jordan, hrawashdeh73@yahoo.com
[4] Jerash university, Faculty of Business, Accounting department, Jerash Jordan, drhebarabee@gmail.com

performance on both local and global levels (Gupta et al., 2019). As the use of cloud-based ERP systems grows in tandem with blockchain technology applications to achieve integrated systems, banks have recognized the importance of providing sufficient and effective control systems. This is particularly represented by cloud auditing, to safeguard their assets from potential risks, evaluate their performance, especially financial performance, and enhance confidence in their financial data.

Therefore, the current study aimed to investigate the impact of cloud-based Enterprise Resource Planning (ERP) systems on the adoption of blockchain technology, with the presence of cloud auditing as an intermediary variable, in Jordanian commercial banks.

Study Objectives:

1-To identify the impact of cloud-based ERP systems on the adoption of blockchain technology in Jordanian commercial banks.

2-To understand the impact of cloud-based ERP systems on cloud auditing in Jordanian commercial banks.

3-To explore the impact of cloud-based ERP systems on the adoption of blockchain technology, with the presence of cloud auditing, in Jordanian commercial banks.

Study Problem:

The study problem arises from attempting to establish the relationship and impact of cloud-based ERP systems on the adoption of blockchain technology, considering the presence of cloud auditing implemented in Jordanian commercial banks. Cloud ERP systems have become a strategic choice that leads to radical changes in bank management and information flow, reflecting the current era's requirements. Compliance with these systems signifies the level of scientific and intellectual progress achieved by banks. Furthermore, it highlights the level of interest banks place in achieving their developmental and sustainable goals. Given the utilization of blockchain technologies, cloud ERP systems offer specialized support for the implemented cloud auditing within these banks.

The Study problem is encapsulated in attempting to answer the following questions:

1-Is there a statistically significant impact of cloud-based Enterprise Resource Planning (ERP) systems on the adoption of blockchain technology in Jordanian commercial banks?

2-Is there a statistically significant impact of cloud-based ERP systems on cloud auditing in Jordanian commercial banks?

3-Is there a statistically significant impact of cloud auditing on the adoption of blockchain technology in Jordanian commercial banks?

4-Is there a statistically significant impact of cloud-based ERP systems on the adoption of blockchain technology, with the presence of cloud auditing as an intermediary variable, in Jordanian commercial banks?

Study Hypotheses:

Based on the research problem questions, the study hypotheses are as follows:

H01-There is no statistically significant impact of cloud-based ERP systems on the adoption of blockchain technology in Jordanian commercial banks.

H02-There is no statistically significant impact of cloud-based ERP systems on cloud auditing in Jordanian commercial banks.

H03-There is no statistically significant impact of cloud auditing on the adoption of blockchain technology in Jordanian commercial banks.

H04-There is no statistically significant impact of cloud-based ERP systems on the adoption of blockchain technology, with the presence of cloud auditing as an intermediary variable, in Jordanian commercial banks.

The study aims to explore these hypotheses and investigate the intricate relationships between cloud-based ERP systems, blockchain technology adoption, and cloud auditing in the context of Jordanian commercial banks.

Theoretical side:

The concept of Cloud ERP:

According to (Tongsuksai et al., 2019), a Cloud Enterprise Resource Planning (Cloud ERP) system is a type of adaptable and configurable off-the-shelf software designed to match a company's activities. It works to integrate information and procedures across functional areas and departments of the company, regardless of its geographical location. This integration allows the company to efficiently and effectively manage its informational, material, and human resources by providing comprehensive and integrated solutions for all its information processing needs. In other words, an Enterprise Resource Planning system is a computerized integrated system designed to support all of the company's operations and activities. It includes software for financial, accounting, inventory, marketing, maintenance, human resources, and project management systems. It is also considered a decision support system for the company.

Therefore, (Tavana et al., 2020) defines it as an enterprise resource planning system that relies on general organization methods to integrate planning and management, utilizing all of the enterprise's resources, databases, and employing shared software platforms.

Also, (Carlsson et al., 2022) defined Cloud ERP (Enterprise Resource Planning) systems as comprehensive information systems designed to integrate the resources, processes, and information of all organizational departments such as manufacturing, marketing, sales, inventory management, accounting, maintenance, customer relationship management, human resources management, and e-commerce. This is achieved through an interconnected single system that encompasses a comprehensive database, leading to improved organizational efficiency and contributing to resource optimization and process management.

The intellectual concept of Blockchain.

This technology is based on a peer-to-peer system, meaning that transactions between users of this technology are conducted without any intermediaries. It's a decentralized technology, which means there is no central entity controlling the processes carried out through it. There are no governmental bodies, for example, overseeing its proceedings, nor are there companies that manage and regulate its operations (Bodo et al., 2018).

Key elements of Blockchain in companies and banks.

Blockchain consists of a set of elements as mentioned by (Cao et al., 2018); (Bonson & Bednárová, 2019); and they are:

1- Block: It represents the fundamental unit of the chain and is a collection of operations or tasks intended to be performed or executed within the chain. Examples of blocks include money transfers, data recording, status tracking, or deviations. Typically, each block accommodates a specific amount of operations and information, not exceeding its capacity, to finalize the operations within it. Then a new block is created linked to it. The main goal is to prevent fraudulent transactions within the block that could freeze or hinder the chain from recording and concluding transactions.

2- Transaction: Refers to the sub-process carried out within a single block or the "individual order" (Single Order) executed within the block. It represents, along with other orders and information, the block itself.

3- Hash: It's the distinct genetic code of the blockchain chain. Sometimes referred to as "digital signature," it's a code generated through an algorithm within the blockchain software. It's sometimes called the "Hash Mechanism."

The Concept of Cloud Auditing:

Cloud auditing can be defined as monitoring the performance of cloud services and security controls implemented on the cloud to verify compliance with cloud computing security policies. (Guidelines issued by the Central Bank of Jordan, 2018)

According to (Yang et al., 2019), cloud auditing involves data verification and providing reliable and highly credible authentication results. Real-time data verification is necessary for most cloud applications to ensure smooth operations.

In the researchers' view, the role of a cloud auditor involves monitoring the performance of cloud services and security controls implemented on the cloud to verify compliance with cloud computing security policies. This process takes place within the usual auditing process conducted in banks by an external party. In the end, a report is issued on the extent to which the audited entity (in this case, the commercial bank) complies with the standards related to cloud computing. These standards help maintain the confidentiality and security of data when utilizing cloud providers. These standards offer numerous benefits, including:

• Enhancing Compatibility of Bank Systems with Other Systems, making the transition from one cloud provider to another smoother.

• Ensuring that both banks and cloud providers adhere to best practices in this regard.

• Standards serve as an effective means for banks to compare cloud providers and select the most suitable one, allowing for easier regulatory compliance.

The Intellectual Relationship Between Study Variables:

The researchers perceive banks as currently being viewed as open systems in the external world, both impacting and being impacted by it. Information serves as the link between banks and their environment. Thus, acquiring and managing this information is a key objective for banks. Given the remarkable advancements in modern technology, communication networks, and the emergence of blockchain technology, many banks have embraced the latest developments in information technology and integrated management systems known as Cloud Enterprise Resource Planning (Cloud ERP) systems. This is to optimally utilize information and enhance their resource performance. By achieving their planned objectives, these systems contribute to maintaining data confidentiality and security while utilizing cloud providers.

Cloud ERP systems offer a unified view of all company functions and departments through a comprehensive database, ensuring accurate, integrated, and timely data for decision-making. This is especially relevant in the context of blockchain technologies. All banks strive to adopt Cloud ERP systems to enhance their overall performance in the highly competitive banking landscape. Such systems contribute to cost reduction, data accuracy, and integrated decision-making, particularly with blockchain technologies.

Implementing Cloud ERP systems in banks not only improves the quality of services but also aids in storing, applying, and recording all operations in a timely manner, aligning with blockchain techniques. This mitigates risks impacting the quality of cloud auditing. Cloud ERP systems enable the cloud auditor to design and implement internal regulations that align with employee interests and do not contradict business interests. Additionally,

they enhance internal control efficiency through better work planning, evidence collection, and evaluation. Furthermore, these systems assist in collecting the necessary information for auditing tasks, ensuring the accuracy and reliability of financial data. Auditors can assess the internal control system more effectively, identifying potential risks and areas of concern, thereby facilitating management's ability to find appropriate solutions to confront these risks.

Practical Side:

Study Methodology:

The researchers adopted a descriptive-analytical methodology to describe and analyze the phenomenon under study, which revolves around Cloud Enterprise Resource Planning (Cloud ERP) systems and their impact on blockchain networks, as well as the intermediary role of cloud auditing and its significance in Jordanian commercial banks. Data collected through surveys were analyzed to establish relationships between variables, opinions, processes involved, and the resulting effects.

Study Population and Sample:

The study population consists of Jordanian commercial banks listed on the Amman Stock Exchange. As per the official exchange website, there were 12 banks listed as of the end of 2022. The study used a comprehensive questionnaire methodology to determine the sample size, meaning it included all Jordanian commercial banks listed on the Amman Stock Exchange. Thus, the study's sample comprises 12 Jordanian banks.

Study Analysis Unit :

This unit comprised a sample of employees across various management levels, including top, middle, and lower management, in each bank's main administration. This included general managers, their deputies, department managers, section heads, and unit heads, along with heads of departments such as Financial Facilities, Internal Auditing, Risk, Human Resources, and Information Technology in Jordanian commercial banks. Due to difficulties in precisely determining the number of employees, the researchers distributed 15 questionnaires in each bank to target a broad range of employees within the mentioned departments. This resulted in the distribution of 180 questionnaires, out of which 167 valid questionnaires were collected for statistical analysis. The retrieval rate reached 92.7% of the total distributed questionnaires.

Data Processing, Analysis, and Hypothesis Testing:

Testing the Reliability of the Study tool:

The Cronbach's Alpha coefficient is commonly used to assess the reliability of the study tool (questionnaire). It was relied upon to measure the sample individuals' attitudes toward the study model variables. The result of this coefficient is considered acceptable and statistically significant if the Cronbach's Alpha value reaches or exceeds 0.70, as indicated by researchers Sekaran and Bougie (2016). Upon reviewing the data in Table (1), it's evident that the Cronbach's Alpha coefficient was measured for the items of each variable in the study model, as well as for the dimensions of these variables and all items of the study tool. This was done to determine the consistency of responses from the sample individuals, especially since the Cronbach's Alpha coefficient is also known as the internal consistency coefficient.

Table (1): Cronbach's Alpha Coefficient Values (Internal Consistency Coefficient)

Number	Variable	# of items	Alpha's Value
1	Technological Efficiency	4	0.948
2	Collaboration with External Experts and Providers	4	0.930
3	Support from Top Management	4	0.893
4	Organizational Culture	4	0.908
5	Characteristics of Cloud Enterprise Resource Planning Systems	4	0.927
6	Effective Digital Administrative Communication	4	0.938
7	Cloud Enterprise Resource Planning Systems	24	0.971
8	Blockchain	16	0.965
9	Cloud Auditing	5	0.945
Study tool		45	0.982

It appears that the Cronbach's Alpha coefficient for the items of the study tool ranged from (0.893) to (0.971). Furthermore, the overall value reached (0.982) for all items, indicating that all values are greater than (0.70). This demonstrates consistency among the study tool's items, as well as the reliability and usability of the study tool for statistical analysis.

Linear Regression and Correlation Analysis:

To validate the suitability of the study model for conducting linear regression analysis, it is crucial to ensure the presence of a linear relationship between the dependent and independent variables. It's also important to ensure that the data is free from the issue of collinearity. This statistical phenomenon involves a correlation between two or more variables that can be nearly perfect, leading to an inflated value for the coefficient of determination (R-squared), making it seem larger than its actual value. The correlation coefficient between the study's independent variable, according to the study model, was calculated, and the results were as follows:

Table (2): Correlation Matrix of Study Model Variables

Number	Variable	1	2	3	4	5	6	7	8	9
1	Technological Efficiency	1.000								
2	Collaboration with External Experts and Providers	0.753 **	1.000							
3	Support from Top Management	0.712 **	0.746 **	1.000						
4	Organizational Culture	0.597 **	0.655 **	0.703 **	1.000					
5	Characteristics of Cloud Enterprise Resource	0.518 **	0.614 **	0.652 **	0.741 **	1.000				

Number	Variable								
	Planning Systems								
6	Effective Digital Administrative Communication	0.499 **	0.549 **	0.604 **	0.706 **	0.739	1.000		
7	Cloud Enterprise Resource Planning Systems	0.836 **	0.881 **	0.897 **	0.873 **	0.848 **	0.800 **	1.000	
8	Blockchain	0.538 **	0.607 **	0.637 **	0.747 **	0.754 **	0.792 **	0.793 **	1.000
9	Cloud Auditing	0.459 **	0.506 **	0.559 **	0.702 **	0.694 **	0.737 **	0.712 **	0.814 **	1.000

(**) Significant at the 0.01 level

(Table 2) shows that the highest correlation coefficient was between the independent variables (Technological Efficiency) and (Collaboration with External Experts and Providers), which reached (0.753). This value is less than (0.80), indicating the absence of a significant multicollinearity issue among the variables. A correlation coefficient value exceeding(0.80) is considered an indicator of high multicollinearity (Guajarati, 2004).

On the other hand, it only became apparent that there is a significant linear relationship between the variables of the study model. The correlation coefficients with Blockchain and Cloud Auditing showed statistically significant values. This provides preliminary support for the study's hypotheses.

Description of Sample Responses:

The study relied on means, standard deviations, and relative importance rankings to describe the sample responses to the questionnaire items and its dimensions. The following results were obtained:

Table (3): Description of Study Model Variables and Sub-Dimensions

Number	Variable	Mean	S.D	Rank	Relative Importance
1	Technological Efficiency	3.824	0.971	1	High
2	Collaboration with External Experts and Providers	3.798	0.936	2	High
3	Support from Top Management	3.738	0.849	3	High
4	Organizational Culture	3.535	0.867	4	Moderate
5	Characteristics of Cloud Enterprise Resource Planning Systems	3.512	0.912	5	Moderate
6	Effective Digital Administrative Communication	3.477	0.959	6	Moderate
7	Cloud Enterprise Resource Planning Systems	3.647	0.782		Moderate
8	Adopting Blockchain	3.475	0.852		Moderate
9	Cloud Auditing	3.462	0.939		Moderate

(Table 3) indicates that the attitudes of the sample participants were towards moderate relative importance of Cloud ERP systems. The average mean score was 3.647, with a standard deviation of 0.782. All dimensions of the independent variable (Cloud ERP systems) showed high and moderate levels of relative importance. The dimension of (Technological Efficiency) ranked first with an average mean score of 3.824 and a standard deviation of 0.971. Meanwhile, the dimension of (Effective Digital Administrative Communication) appeared in the sixth position with an average mean score of 3.477 and a standard deviation of 0.959.

Additionally, the table shows that the attitudes of the sample participants were towards moderate relative importance for adopting Blockchain technology, with an average mean score of 3.475 and a standard deviation of 0.852. The variable of (Cloud Auditing) also appeared with an average mean score of 3.462 and a standard deviation of 0.939, indicating a high level of relative importance.

The Confirmatory Factor Analysis (CFA)

The Confirmatory Factorial Analysis was conducted to test whether the dimensions of the study model align with its theoretical structure and the researcher's understanding of the model's nature. CFA is a type of factor analysis and is one of the key applications of Structural Equation Modeling (SEM). It aims to confirm the hypothesized relationships between observed variables and latent constructs.

Table 4 presents the results of the CFA, including various fit indices that assess the goodness of fit between the hypothesized model and the observed data. These fit indices provide insights into the degree to which the model fits the data and helps to determine the validity of the proposed structure. The CFA is crucial for confirming the theoretical framework and ensuring that the dimensions and constructs in the study accurately reflect the underlying concepts.

Table (4): Confirmatory Factorial Analysis

Index	CMIN/DF	CFI	GFI	NFI	RMSEA
Reference Value	<5	>0.90	>0.90	>0.90	<0.10
Calculated Value	2.476	0.989	0.965	0.981	0.077

The results of the statistical analysis in Table (4) revealed that the squared chi-value, after being divided by the degrees of freedom, equals (CMIN/DF = 2.476), which is less than the number 5. The square root index of the root mean square error of approximation (RAMSEA = 0.077) is a value close to zero. On the other hand, the goodness-of-fit index (GFI = 0.965) reached a value that is somewhat close to one. The closer it gets to one, the better the fit quality. Similarly, the comparative fit index (CFI = 0.989) is also approaching one to some extent. The normed fit index (NFI = 0.981) also reached a value close to one. This indicates that all indices suggest a good model fit.

Hypothesis Testing:

The current study included four hypotheses as follows:

H01-There is no statistically significant impact of cloud-based ERP systems on the adoption of blockchain technology in Jordanian commercial banks.

This hypothesis aimed to study the direct causal relationship between the independent variable (cloud-based ERP systems) and the dependent variable (adoption of blockchain technology).

H02-There is no statistically significant impact of cloud-based ERP systems on cloud auditing in Jordanian commercial banks.

This hypothesis aimed to study the direct causal relationship between the independent variable (cloud-based ERP systems) and the mediating variable (cloud auditing).

H03-There is no statistically significant impact of cloud auditing on the adoption of blockchain technology in Jordanian commercial banks.

This hypothesis aimed to study the direct causal relationship between the mediating variable (cloud auditing) and the dependent variable (adoption of blockchain technology).

H04-There is no statistically significant impact of cloud-based ERP systems on the adoption of blockchain technology, with the presence of cloud auditing as an intermediary variable, in Jordanian commercial banks.

This hypothesis aimed to study the direct causal relationship between the independent variable (cloud-based ERP systems) and the dependent variable (adoption of blockchain technology), mediated by the indirect causal relationship of the mediating variable (cloud auditing).

Path Analysis was employed to test the hypotheses. The first, second, and third hypotheses were examined using the results of direct regression estimates. On the other hand, the fourth hypothesis was tested using the results of both direct and indirect effects, as well as the total effect. Table (5) presents the outcomes of the analysis for the initial three hypotheses.

Table (5) displays the results of the direct regression analysis and the testing of the first, second, and third hypotheses.

Hypothesis	Regression Path	Estimate Regression Coefficient	S.E Standard Error	C.R Critical Ratio	P Significance level
H01	cloud-based ERP system → Block Chain	0.507	0.058	8.801	0.000
H02	cloud-based ERP systems→ Cloud auditing	0.894	0.058	15.349	0.000
H03	Cloud auditing→ Block chain	0.408	0.046	8.813	0.000

Based on the results from the above table, the following has been revealed:

Results of Hypothesis H01: It was evident that the regression coefficient of the variable (cloud-based enterprise resource planning systems) on (adopting blockchain technology) was found to be (Estimate=0.507). The critical ratio (C.R) reached a value of (CR=8.801), and at a significance level of (P=0.000), indicating a statistically significant positive effect. Therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted, which states: "There is a statistically significant impact of cloud-based enterprise resource planning systems on the adoption of blockchain technology in Jordanian commercial banks."

Results of Hypothesis H02: It was evident that the regression coefficient of the variable (cloud-based enterprise resource planning systems) on (cloud auditing) was found to be (Estimate=0.894). The critical ratio (C.R) reached a value of (CR=15.349), and at a significance level of (P=0.000), indicating a statistically significant positive effect. Therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted, which states: "There is a statistically significant impact of cloud-based enterprise resource planning systems on cloud auditing in Jordanian commercial banks."

Results of Hypothesis H03: It was evident that the regression coefficient of the variable (cloud auditing) on (adoption of blockchain technology) was found to be (Estimate=0.408). The critical ratio (C.R) reached a value of (CR=8.813), and at a significance level of (P=0.000), indicating a statistically significant positive effect. Therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted,

which states: "There is a statistically significant impact of cloud auditing on the adoption of blockchain technology in Jordanian commercial banks."

To determine the mediating role of cloud auditing on the relationship between cloud-based enterprise resource planning systems and the adoption of blockchain technology, the analysis was conducted on the main fourth hypothesis, and the results were as follows:

Table (6): Results of Path Analysis to verify the direct and indirect effects of dimensions of cloud-based enterprise resource planning systems on blockchain technology adoption with cloud auditing as a mediating variable.

Table (6): Direct, Indirect, and Total Effects Coefficients for the Main Fourth Hypothesis.

	Direct effect		Indirect effect		Total effect	
	cloud-based ERP system	Cloud auditing	cloud-based ERP system	Cloud auditing	cloud-based ERP system	Cloud auditing
Cloud auditing	0.894	-	-	-	0.894	-
Block Chain	0.507	0.408	0.365	-	0.872	0.408

The Table (6) reveals that the significant direct effect of cloud-based enterprise resource planning systems on cloud auditing was (0.894), while the significant direct effect of cloud-based enterprise resource planning systems on adoption of blockchain technology was (0.507). Furthermore, the significant direct effect of cloud auditing on blockchain technology adoption was (0.408).

Table (6) also demonstrates that the indirect effect of cloud-based enterprise resource planning systems on blockchain technology adoption, with the mediating variable of cloud auditing, was (0.365). This significant effect confirms the mediating role of cloud auditing in the relationship between cloud-based enterprise resource planning systems and blockchain technology adoption. The total effect of cloud-based enterprise resource planning systems, with the presence of cloud auditing as a mediating variable, was (0.872), signifying statistical significance at a significance level of less than 0.05. Therefore, cloud auditing is considered a partial mediator.

This affirms the positive role of cloud auditing as a mediating variable in the impact of cloud-based enterprise resource planning systems on the adoption of blockchain technology. Consequently, it can be concluded that there is an indirect effect of cloud-based enterprise resource planning systems on blockchain technology adoption, mediated by cloud auditing. As a result, the null hypothesis is rejected, and the alternative hypothesis is accepted, which states: "There is a statistically significant impact at a significance level ($\alpha \leq 0.05$) of cloud-based enterprise resource planning systems on the adoption of blockchain technology with the presence of cloud auditing as an intermediary variable in Jordanian commercial banks.
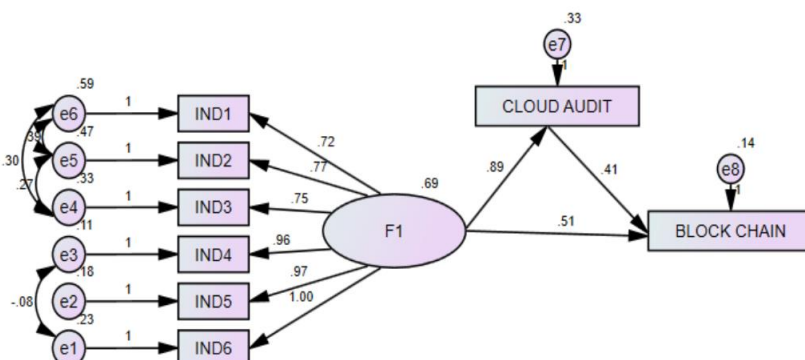
Results and Recommendations

Results:

The study reached the following conclusions:

1-The relative importance level analysis of cloud-based enterprise resource planning systems in Jordanian commercial banks revealed that dimensions such as (technological efficiency, collaboration with external experts and providers, top management support) hold high relative importance. Meanwhile, dimensions like (organizational culture, characteristics of cloud-based enterprise resource planning systems, effective digital administrative communication) were of moderate relative importance. This indicates a somewhat considerable interest by Jordanian commercial banks in applying integrated business techniques that support key activities and tasks. They focus on utilizing technological advancements to provide valuable and timely information, enhance participation, improve planning and decision-making processes, create a supportive environment for usage, and promote collaboration with external experts and system service providers to attain technical support throughout the system's usage phases. The banks aim to ensure comprehensive support for their staff, implement procedures that enhance system operations, and achieve efficiency and operational effectiveness to meet desired objectives.

2-The relative importance level analysis of blockchain technology adoption in Jordanian commercial banks signifies a moderate level of importance. This suggests a partial interest in blockchain technology, potentially due to its novelty and the lack of sufficient awareness and recognition regarding its importance and role in banking activities. There might also be concerns related to associated risks.

3-The relative importance level analysis of cloud auditing in Jordanian commercial banks indicates a partial interest in cloud auditing application. This can be attributed to cloud auditing being one of the essential practices reliant on cloud services for data storage and processing. The interest stems from the recognition that implementing cloud auditing requires auditors to possess adequate knowledge of cloud technology and appropriate auditing techniques. Additionally, they need the capability to access all necessary information for auditing purposes.

4-There is a statistically significant impact of cloud-based enterprise resource planning systems on the adoption of blockchain technology in Jordanian commercial banks. This impact can be attributed to the fact that utilizing these systems contributes to enhancing communication and collaboration between banks and other parties within blockchain networks. This is achieved through secure and efficient data and information exchange among participants. Furthermore, it strengthens trust between banks and these participants by accurately and continuously monitoring and documenting transactions. Additionally, the utilization of cloud-based systems improves the speed and efficiency of financial transactions associated with blockchain networks while reducing costs like processing and intermediation fees. It also enhances data and financial operation security through precise documentation and encryption.

5-There is a statistically significant impact of cloud-based enterprise resource planning systems on cloud auditing adoption in Jordanian commercial banks. This impact can be attributed to the role of cloud-based enterprise resource planning systems in providing a unified and centralized data structure for financial and business operations in banks. This facilitates comprehensive and systematic auditing of records and transactions. Furthermore, it grants auditors easy and swift access to data and information stored in the cloud. This assists in conducting audits effectively and timely, empowering auditors to analyze large datasets using automated analysis tools and techniques.

6-There is a statistically significant impact of cloud auditing on the adoption of blockchain technology in Jordanian commercial banks. This effect can be linked to the

role of cloud auditing in enhancing trust, security, and compliance within blockchain networks. It achieves this by verifying the accuracy and integrity of financial transactions and data recorded on the blockchain. Moreover, it evaluates and analyzes associated risks, identifies vulnerabilities, and reinforces security measures. Cloud auditing also ensures adherence to standards and policies governing blockchain usage, while enhancing operational and financial efficiency within blockchain networks.

7-There is an impact of cloud-based enterprise resource planning systems on blockchain technology adoption with the presence of cloud auditing as an intermediary variable in Jordanian commercial banks. This effect is attributed to the combined roles of cloud-based enterprise resource planning systems and cloud auditing in enhancing security and protection within blockchain networks. They achieve this by providing mechanisms for data validation and transaction authentication, thus mitigating fraud and manipulation risks. These systems also offer flexible infrastructures for blockchain adoption by providing cloud auditing with suitable recommendations and guidance based on industry practices and standards. This effect ultimately reduces the costs associated with blockchain implementation and maintenance in banks.

Recommendations:

The study suggests the following recommendations:

1-Jordanian commercial banks should carefully select a suitable cloud-based enterprise resource planning system that aligns with their specific needs. This ensures the achievement of desired objectives from its utilization.

2-Jordanian commercial banks should consistently monitor and evaluate the performance of their cloud-based enterprise resource planning systems. This evaluation helps in assessing their effectiveness and identifying areas that require improvement and development.

3-Enhance the skills and capabilities of employees working with cloud-based enterprise resource planning systems in Jordanian commercial banks. They should be well-versed in using the system and understanding its associated processes to ensure effective and optimal utilization.

4-Precisely define the objectives and benefits of adopting cloud-based enterprise resource planning systems and implementing cloud auditing in Jordanian commercial banks. This might include improving efficiency, accuracy, process organization, and risk management.

5-Jordanian commercial banks should provide robust data security measures during cloud auditing and establish strong and effective security protocols to protect data in cloud-based enterprise resource planning systems.

6-Offer appropriate training and awareness programs to the auditing teams in Jordanian commercial banks regarding cloud auditing. This aims to increase their knowledge of cloud technologies, tools, and cloud auditing skills.

7-Collaborate with technology service providers and specialized companies in the field of blockchain to leverage their expertise and guidance.

8-Ensure that Jordanian commercial banks meet all requirements and procedures to comply with laws and regulations related to financial technology and blockchain.

9-Host training workshops and sessions aimed at educating employees about financial technology and how to effectively use it, along with its potential benefits.

10-Jordanian commercial banks should regularly conduct analyses to explore potential use cases for blockchain technology in various operations, particularly those related to enhancing financial transactions and promoting security and transparency.

References

Acar, M., Aydiner, A., Zaim, S. & Delen, D. (2020). Supply chain orientation, ERP usage and knowledge management in supply chain. In Proceedings of the International Symposium for Production Research 2019 (pp. 580-590). Springer International Publishing

Bodo, B.,& Gervais, D., & Quintais, J. (2018). Blockchain and smart contracts: the missing link in copyright licensing? International Journal of Law and Information Technology. 26. 311–336.

Bonson, E., & Bednárová, M. (2019). Blockchain and its implications for accounting and auditing. Meditari Accountancy Research, 27(5), 725-740.

Cao, S., Cong, L. W., & Yang, B (2018). "Auditing and Blockchains: Pricing, Misstatements, and Regulation." Working paper, Georgia State University.

Carlsson-Wall, M., Goretzki, L., Hofstedt, J., Kraus, K. & Nilsson, C. (2022). Exploring the implications of cloud-based enterprise resource planning systems for public sector management accountants. Financial accountability & management, 38(2), 177-201.

Central Bank of Jordan (2018). Cloud Computing Guidance Handbook. Amman, Jordan.

Chaudhari, B. (2020). Cloud computing on AWS. LinkedIn. Retrieved from https://www.linkedin .com/pulse/cloud-computing-aws-bhakti-chaudhari.

Gupta, S., Qian, X., Bhushan, B. & Luo, Z. (2019). Role of cloud ERP and big data on firm performance: A dynamic capability view theory perspective. Management Decision, 57(8), 1857–1882.

Gujarati, D.N. (2004) Basic Econometrics. 4th Edition, McGraw-Hill Companies.

Migdadi, M. & Abu Zaid, M. (2016). An empirical investigation of knowledge management competence for enterprise resource planning systems success: Insights from Jordan. International Journal of Production Research, 54(18), 5480–5498.

Sekaran, U. and Bougie, R. (2016) Research Methods for Business: A Skill-Building Approach. 7th Edition, Wiley & Sons, West Sussex.

Tavana, M., Hajipour, V. & Oveisi, S. (2020). IoT-based enterprise resource planning: Challenges, open issues, applications, architecture, and future research directions. Internet of Things, 11

Tongsuksai, S., Mathrani, S. & Taskin, N. (2019). Cloud enterprise resource planning implementation: a systematic literature review of critical success factors. In 2019 IEEE Asia-Pacific Conference on Computer Science and Data Engineering (CSDE) (pp. 1-8). IEEE

Yang, Yijun; Chen, Fei; Sun, Zhiwei; Wang, Shulan; Li, Jianqiang; Chen, Jianyong; Ming, Zhong. Soft Computing - A Fusion of Foundations, Methodologies & Applications. Sep2019, Vol. 23 Issue 18, p8907-8925. 19p. DOI: 10.1007/s00500-018-3489-y. , Database: Computers & Applied Sciences Complete