THE EXTENT OF COMMERCIAL BANKS' READINESS TO IMPLEMENT BLOCKCHAIN TECHNOLOGY

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Abstract

This study aimed to find out the readiness of Jordanian commercial banks to implement blockchain technology. The population of this study consisted of thirteen Jordanian banks. The study targeted the employees of the higher departments represented by the general managers and their deputies, and the employees of the middle departments represented by the directors and heads of the departments of each of the finance, internal auditing, and information technology departments in Jordanian banks. The study used the survey method to collect data and the SPSS Statistics 20.0 program to process and analyze the data. The most important results of the study were the presence of a statistically significant impact of the banks' readiness with its dimensions (administrative readiness, professional readiness, organizational readiness, and legislative readiness) in the blockchain technology with its dimensions (the use of blockchain technology, hashing, information, and time imprint). As for the most important recommendations, it crystallizes the need for Jordanian banks to carry out a continuous updating process on the data within the block, and to apply periodic tests on the block operations to verify that there are no gaps in the chain.

Keywords: Readiness, Jordan, Commercial Banks, Blockchain Technology

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1. INTRODUCTION

In the past few years, cryptocurrency has become a buzzword in both business and academia. As one of the most successful cryptocurrencies, bitcoin's capital market reached 10 billion dollars in 2016 (Hileman, 2016). A blockchain-based technology that was first proposed in 2008 and implemented in 2009 was the core technology used to build the bitcoin network, which uses a specially designed data storage structure to process transactions without involving any third parties (Lichtenthaler, 2020; Nakamoto, 2008). Blocks of data are the storage of all committed transactions on a blockchain, which can be viewed as a public ledger.

The chain continues to grow as new blocks are added to it continuously. In general, blockchain technology is characterized by decentralization, persistence, anonymity, and auditability. With these characteristics, blockchain can greatly save the cost and improve efficiency (Zheng et al., 2017). Our current era has become largely based on advanced pioneering technology, which has facilitated a lot of effort and time. It has also become a major necessity for all commercial banks of all sizes and types. Because of the high advantages it offers in the quality of the services it provides, it has also become a mainstay in obtaining investments and obtaining profits (Martino, 2019). Since its appearance in 2008, blockchain technology is considered one of the most powerful technologies that revolutionized the world of innovation within the banking sector in the Arab and Western world, as it is considered one of the most important pioneering technologies affecting the features of the national economy (Berchin et al., 2020). This foundational technology was established to upgrade the infrastructure of financial services so that the quality of provided banking services improve, affecting both domestic and international remittances, international trade finance services and other banking transactions (Dicuonzo et al., 2021).

The problem of the study is to try to answer What is the level of readiness availability of Jordanian commercial banks? What is the level of application of blockchain technology in Jordanian commercial banks? Is there a statistically significant impact of the bank's readiness with its dimensions (administrative readiness, professional readiness, organizational readiness, and legislative readiness) in the blockchain technology with its dimensions (the use of blockchain technology, hashing, information, and time imprint) in Jordanian commercial banks?

We pose the following research questions:

RQ1: Is there a statistically significant impact of administrative readiness in blockchain technology in Jordanian commercial banks?

RQ2: Is there a statistically significant impact of professional readiness in blockchain technology in Jordanian commercial banks?

RQ3: Is there a statistically significant impact of organizational readiness in blockchain technology in Jordanian commercial banks?

RQ4: Is there a statistically significant impact of legislative readiness in blockchain technology in Jordanian commercial banks?

Furthermore, the study seeks to achieve the following objectives:

1. Identifying the level of readiness availability of Jordanian commercial banks.

2. Identifying the level of application of blockchain technology in Jordanian commercial banks.

3. Determining the impact of the banks' readiness with its dimensions (administrative readiness, professional readiness, organizational readiness, and legislative readiness) in the blockchain technology in its dimensions (the use of blockchain technology, hashing, information, and time imprint) in Jordanian commercial banks.

As well as, the following sub-objectives are derived from these objectives:

• determining the impact of administrative readiness on the block technology in Jordanian commercial banks;

• determining the impact of professional readiness in blockchain technology in Jordanian commercial banks;

• determining the impact of organizational readiness on blockchain technology in Jordanian commercial banks;

• determining the impact of legislative readiness on blockchain technology in Jordanian commercial banks.

Therefore, this study worked to identify the readiness of Jordanian commercial banks in applying this technology to reach banking leadership at the local and global levels.

The remainder of this paper is structured as follows. Section 2 describes the review of the literature. Section 3 presents the research methodology. Section 4 outlines the hypothesis testing. Section 5 provides a discussion of the results. Section 6 presents the conclusion.

2. LITERATURE REVIEW

2.1. Jordanian bank sector

Since 2009, Jordan's banking system has been experiencing a "new normal", as economic growth has decelerated. There are few natural resources in Jordan and it depends heavily on energy and food, leading to significant trade deficits. Jordan imports three times as much as it exports (ACAPS & MapAction, 2014). Moreover, the official unemployment is currently 24.7% (2020), although the actual unemployment rate is estimated to be even higher, especially among youth (Saidat et al., 2022; World Bank, 2013).

Jordan's banking system, the primary source of financing for the country, accounts for 20.8% of its gross domestic product (GDP) and insurance and real estate (Alt et al., 2018). Among the 24 banks operating on Jordan's territory are 3 Islamic banks and 8 foreign banks, as well as an extensive network of 844 branches and 83 representative offices throughout the country. Providing significant direct and indirect employment opportunities and providing a substantial national infrastructure, Figure 1 illustrates the range of credit facilities offered by banks for the year 2020, highlighting the importance of banks to the Jordanian economy. There were 25% of credit facilities provided for construction, 16% for general trade, and 12% for industry (World Bank, 2013).

Figure 1. The range of credit facilities offered by banks for the year 2020
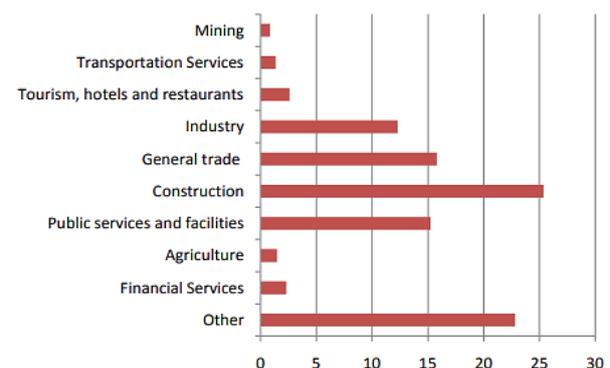
The banking sector is faced with serious risks in the age of globalization, including currency, credit, interest rate, and liquidity. Poor practices in the sector have resulted in job losses, corporate bankruptcy, and significant economic losses (World Bank, 2013). Among Jordan's weak points is the lack of long-term lending and unsecured loans (European Bank for Reconstruction and Development [EBRD], 2015). As a result, the system is delayed, and investors and borrowers are not adequately protected (EBRD, 2015).

As Jordan suffers from a severe economic crisis, unemployment rates are on the rise, public debt is growing, and the public budget deficit is widening (Zeitun & Benjelloun, 2012). These factors increase risks and negatively affect bank performance (Al-Khasawneh et al., 2018). The financial services market in Jordan is uncompetitive (Al Sukkar & Hasan, 2005). Although we have seen an acceleration in the marketization of the financial sector recently due to technological innovation.

In recognition of the fact that finance is not an independent concept, but rather embedded in numerous real-life scenarios, internet finance companies are seeking the best ways to expand their markets, by developing mobile terminals and applications to meet the needs of different scenarios and to gain potential customers' attention (Al-Khasawneh et al., 2018). Today, banks' dominance is being challenged by the growth of the online finance ecosystem, which is affecting the way they interact with their clients on a daily basis. Jordan must embrace genuine technological advances in order to keep growing (Gupta et al., 2018). In addition to artificial intelligence, big data, and robotic process automation, blockchain technology, considered a key future technology, has the potential to lead to significant advancement in the financial sector. Blockchain is attracting a lot of attention from banks, private equity firms, start-ups, and other financial institutions (EBRD, 2015).

The key advantage of blockchain is the decentralized and immutable ledger, as well as the potential to revolutionize record-keeping systems, with all records transparent and irreversible, as well as the smart contracts feature for automating payments, blockchain technology can be used in banks and almost every business (Al-Khasawneh et al., 2018; Gupta et al., 2018). The advantages for the Jordanian banks implementing blockchain technology are efficiency, cost reduction, transparency, and limitation the third-party intermediaries. Blockchain technology increases transaction efficiency by removing almost all the time previously involved in decision-making by automating record keeping. Moreover, it drastically reduces the cost of transactions and operations, with payments made almost automatically without intermediaries or fees. Trust is ensured through encryption and the transparency of the distributed real-time information on transactions (Gupta et al., 2018). These dramatic benefits need to be considered alongside potential deficiencies.

H_0 (null hypothesis): There is no statistically significant impact at a significant level $\alpha \leq 0.05$ for the bank's readiness with its dimensions in the blockchain technology in its dimensions in Jordanian commercial banks.

2.2. Readiness concept

Readiness is one of the concepts that are spreading nowadays due to its importance in all sectors, and it expresses an organizational change, a switch, or a deliberate acceleration in the procedures, organizational structures, and trends of bank employees. The idea here stems mainly from the readiness to face a specific situation that deserves prior forethought. The organization or banks that are ready are the organization or banks that are ready to face a specific matter that is expected to happen, and the readiness of the administration means the ability of the administration to prepare in advance to confront a problem or expected orders (Abdullah, 2018).

2.2.1. Administrative readiness

This readiness is achieved through the availability of executive managers whose work is largely related to effective monitoring and guidance of employees, in other words, they are keen on directing and controlling the administrative function. They distribute tasks and jobs to various workers, in addition to providing all instructions and directions for all daily activities, and also focusing on their responsibility to monitor the quality of reports and ensure that they are completed in the required manner, and they are also charged with the responsibility of maintaining good relations and work to solve any problem facing the company's employees and they based on providing training for workers and then preparing periodic reports on the extent of their performance, and then identifying the difficulties and obstacles that stand in the way of achieving the management's goals, and then working to find appropriate solutions to them (He, 2021).

H_{01}: There is no statistically significant impact at the level of significance $\alpha \leq 0.05$ for administrative readiness in the blockchain technology in Jordanian commercial banks.

2.2.2. Professional readiness

Professional readiness is considered one of the most important advantages that support banks from a professional point of view and distinguish them from others, which is considered a basis for success. It is facing a great challenge to face any radical and competitive changes, which lead to the imposition of new types of skills to be able to follow any course of events in the labor market. This leads to the introduction and creation of mechanisms that enable bank employees to follow up on new knowledge, through targeted and planned training courses offered by those banks to their employees (Al-Mahamid, 2014).

H_{02}: There is no statistically significant impact at the level of significance $\alpha \leq 0.05$ for professional readiness in blockchain technology in Jordanian commercial banks.

2.2.3. Organizational readiness

Organization is the secret of the success of business organizations and banks of all kinds in the current era, whether these organizations are public, private, or profit-making, and regardless of the work carried out by these organizations and banks, the more basic business requirements in these organizations and banks are organized and achieved the desired goals of them, and fully consistent with the rest of the administrative functions.

H_{03}: There is no statistically significant impact at the level of significance $α ≤ 0.05$ for organizational readiness in blockchain technology in Jordanian commercial banks.

2.2.4. Legislative readiness

The importance of legislative readiness on the part of banks lies in their commitment to implement a specific standard imposed by the central bank that legislates the laws, which issues instructions to banks, on the one hand, as a supervisory authority based on the process of ensuring the application of the source legislation, and by the authorities to be supervised and is represented here (applied legislation), and work to find a linking mechanism between them.

H_{04}: There is no statistically significant impact at the level of significance $α ≤ 0.05$ for legislative readiness in blockchain technology in Jordanian commercial banks.

2.3. Blockchain concept

Blockchain technology or *blockchain* is a real revolution in the world of financial trading, not just financial trading, but it goes beyond that to be a comprehensive and reliable technology to create an integrated technological system like the Internet system that we are accustomed to (Singhal et al., 2018).

This technology is based on a peer-to-peer system, i.e., transactions are conducted between users of this technology without any intermediary, it is a decentralized technology, that is, there is no one controlling the operations which means that there are no government agencies, for example, that manage the course of things in it, not even companies can control and organize it (Bodó et al., 2018). Blockchain is also known as a technology that operates in the form of an electronic record system for processing and recording transactions, allowing all parties to trace information over a secure network that does not require third-party verification (Al-Sayed & Ahmed, 2018). Furthermore, blockchain consists of a set of elements as mentioned by Ramdani et al. (2020), Cao et al. (2018), and Bonsón and Bednárová (2019).

Block represents the building block of the chain, which is a set of operations or tasks to be performed or their implementation within the chain. Examples of blocks are money transfers, data registration, case follow-up, etc. Usually, each block accommodates a specific amount of operations and information, which is not acceptable to exceed until the operations within it are completed completely. Then a new block is created and linked to it, and

the main goal is to prevent fake transactions within the block that cause the chain to freeze or prevent it from recording and terminating transactions.

1. *Information:* It means the sub-process that takes place within the same block, or it is the "single order" that takes place within the block, and it represents other orders and information in the same block.

2. *Hash:* Is the DNA characteristic of the blockchain, and is sometimes referred to as a "signature digital". It is a code that is produced through an algorithm inside a blockchain program called the "hash function" and performs four main functions (Al-Emian, 2020):

• Distinguish the chain from other chains, where each one gets its own unique hash.

• Identification of each block and distinguishing it from others within the chain, as each block also takes its own hash.

• Marking each piece of information within the same block with a special hash.

• Linking the blocks to each other within the chain, where each block is linked to its previous hash and the hash following it, making the hash go in only one direction from the original block following it, and so on. It is noted here that hashing does not allow modification of the generated blocks.

3. *Time imprint:* It is the time during which any operation within the chain was performed (Daluwathumullagamage & Sims, 2020).

The researchers see the need to motivate commercial banks to increase the application of blockchain programs and appropriate algorithms to formulate the appropriate hash from the first time in the bank, and also to increase the level of interest in completing banking operations within the blocks with high accuracy and efficiency. As well as increasing the level of interest in determining the exact time of the operation within the chain. This requires a high readiness from those banks to apply this technology with absolute high professionalism in order to reach a pioneering level at the various local and global levels (Bonsón & Bednárová, 2019).

3. RESEARCH METHODOLOGY

3.1. Study population and sample

The study population consisted of 13 Jordanian commercial banks. Due to the small size of the study population, the comprehensive survey method was followed in determining the study sample. The study sample included all the components of the study community, which are 13 Jordanian commercial banks.

The study targeted the employees of the higher departments represented by the general managers and their deputies, and the employees of the middle departments represented by the directors of the departments and heads of the departments of the financial, internal audit, and information technology departments in the Jordanian commercial banks. The study used the survey method in collecting data from the members of the study community, through a questionnaire that was designed and distributed to the study sample members. Where 130 questionnaires were distributed, and 10 questionnaires were distributed

in each bank to cover all job positions under study, in cooperation with the Human Resources Department in each bank.

One hundred twenty-one (121) questionnaires were retrieved electronically, and after checking and reviewing the questionnaires, 10 questionnaires were excluded because they were not suitable for statistical analysis due to the presence of incomplete answered paragraphs, so 111 questionnaires valid for analysis were available, at a rate of 85.4% of the total distributed questionnaires.

The following table shows the distribution of the study sample members according to personal and occupational characteristics:

Table 1. Description of the demographic data of the study sample members

Variable	Category	Repetitions	Percentage
Qualification	Bachelor's	3	2.7
	Master's	69	66.7
	Ph.D.	18	26.1
	Other	5	4.5
Years of experience	Less than 5 years	9	8.1
	From 5 to less than 10 years	26	23.4
	From 10 years to less than 15 years	34	30.6
	From 15 years and over	29	26.1
	Accounting	12	10.8
Major	Business Management	52	46.9
	Banking and Financial Sciences	16	14.4
	IT	22	19.8
	Other	15	13.5
	Category	6	5.4
Job title	General manager/Deputy general manager	2	1.8
	Director of the department	30	27.0
	Head of the department	79	71.2
Total		111	100

Table 1 shows the high scientific and knowledge level of the study sample members, as it was found that the largest percentage of them hold a scientific qualification (Bachelor's degree), which amounted to 66.7%, and the percentage of the study sample members who obtained higher degrees (Master's and Ph.D.) was 30.6%. It was also found that the largest percentage of the study sample members have experience ranging between 10 to less than 15 years, which amounted to 30.6%, and this indicates that the study sample members possess the practical experiences and skills necessary to perform the tasks assigned to them. With regard to the major, it was found that the largest percentage of the study sample members are accountants, which amounted to 46.9%, and this corresponds to the nature of work in the banking and financial institutions sector in general. It was also found that 5.4% of the study sample members were from other specialties. Which was represented in management information systems, accounting, and computers. As for the job title, it was found that the largest percentage of the study sample members occupy the position of the head of the department, which amounted to 71.2%, while the members of the study sample who occupy the position of the general manager/deputy general manager formed the lowest percentage, which amounted to 1.8%, this corresponds to the distribution of employees according to the administrative hierarchy in modern organizations.

When any system for banks, such as blockchain, is approved in the Jordanian environment, banks prepare intensive courses for managers at various lower, middle, and higher levels to familiarize them with the essence of this system and to clarify to each department what related to it from that system, and from these departments is the human resources department. Banks provide introductory courses on the impact of these systems on their performance, so nothing is approved or followed until all departments and their employees have completed these courses, as is the case in Jordan, in order to achieve the best and most efficient use of these systems which includes blockchain (Central Bank of Jordan, 2021).

3.2. Data collection sources

The study was based on collecting data from the following two sources.

First: Secondary sources, which are theoretical literature and scientific studies such as books, research, periodicals, theses, pamphlets, and statistical reports related to the topics of the study.

Second: The primary sources, which are represented in the questionnaire that was designed in accordance with the subject, objectives, and questions of the study, using secondary sources, and benefiting from the opinions and experiences of specialists.

To measure the attitudes and estimations of the sample members towards agreeing to the paragraphs of the questionnaire, the cognitive measurement method based on the five-point Likert scale was used, which consists of 5 answers, each corresponding to a numerical representation for the purposes of the analysis, as follows:

Table 2. Agreement trend and digital representation

Agreement trend	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Degree	5	4	3	2	1

In order to determine the level of relative importance of the axes and paragraphs of the questionnaire, the value of the arithmetic mean of the degrees of approval was relied upon, and by applying the following equation (1). Where, the relative importance was categorized into three levels, which are as follows in Table 3.

$$Relative\ importance = (The\ upper\ end\ of\ the\ scale - The\ lower\ end\ of\ the\ scale)/$$
$$The\ number\ of\ levels = (5 - 1)/3 = 1.33 \tag{1}$$

Table 3. Relative importance levels and corresponding arithmetic averages

Mean	Less than 2.33	From 2.33 to less than 3.66	From 3.66 to 5.00
Relative importance	Low	Intermediate	High

3.3. The statistical methods used

The SPSS Statistics 20.0 program was used to analyze the study data, as the following statistical tools were used:
1. Descriptive statistics measures, which included arithmetic means, standard deviations, frequencies, and percentages.
2. The internal consistency coefficient (Cronbach's alpha) to test the stability of the study tool.
3. Variance inflation factor (VIF).
4. Multiple and stepwise linear regression analysis to test the study hypotheses.
5. Validity and reliability of the study tool.
The stability of the study tool was confirmed according to the variables of the study and according to the answers of the respondents in relation to those variables, which are the training programs and job competencies, by calculating the value of Cronbach's alpha coefficient, which measures the internal consistency of the study paragraphs and shows their quality, which means the strength of cohesion between the paragraphs of the scale.

Table 4 shows the stability coefficient of the study dimensions. Alpha values ranged between 0.809 as the lowest value of time imprint as one of the dimensions of blockchain technology, and 0.933 as the highest value of administrative readiness as one of the dimensions of bank readiness. It is noted that all alpha values have exceeded the minimum acceptable percentage for the purposes of statistical analysis, as the value of alpha greater or equal to 0.70 is considered acceptable in research related to administrative and human sciences (Al-Najjar & Clark, 2017, p. 151).

Table 4. Stability coefficient for the items of the study variables' dimensions

Variable	Dimensions	Paragraph number	Alpha
Bank readiness	Administrative readiness	9	0.933
	Professional readiness	7	0.899
	Organizational readiness	10	0.900
	Legislative readiness	5	0.852
	Bank readiness	31	0.969
Blockchain technology	Use of blockchain technology	5	0.902
	Hash	5	0.862
	Information	5	0.854
	Time imprint	5	0.809
	Blockchain readiness	20	0.951

3.4. Suitability of the study model

3.4.1. The multicollinearity test

Table 5 shows the calculation of the VIF for the dimensions of the independent variable to make sure that there is no high correlation and linear overlap between the dimensions of the independent variable.

Table 5. Results of the variance inflation factor test and the tolerance

Variable	VIF	Tolerance
Administrative readiness	5.873	0.170
Professional readiness	2.254	0.444
Organizational readiness	8.720	0.115
Legislative readiness	8.672	0.115

Table 5 indicates that all values of the VIF were greater than 1 and less than 10, as it is clear from the table that all values of the tolerance were greater than 0.1, which indicates that there is no linear relationship between the dimensions of the independent variables (Sekaran & Bougie, 2010, p. 353).

3.4.2. The normal distribution test

Table 6 shows the results of the one-sample Kolmogorov–Smirnov test, which shows the normal distribution of data for the study variables, in order to ensure the suitability of the data for statistical analysis. Where it was found that the Kolmogorov–Smirnov Z-values reached 0.098 for the bank's readiness at the level of significance 0.010, and 0.110 for the blockchain technology and at the level of significance 0.002. Where it is noted that the values came at a significance level of less than 0.05, which indicates that the data are not subject to a normal distribution. However, this result can be overlooked, because the study sample is statistically large (n = 111), which is greater than 30 observations, meaning that all variables can be considered following a normal distribution based on the central limit theory (CLT) (Bohm & Zech, 2010, p. 263).

Table 6. Test for the normal distribution of the study variables

	Bank readiness	*Blockchain technology*
Kolmogorov–Smirnov Z	0.098	0.010
Significance level Asymp. Sig. (2-tailed)	0.110	0.002

3.5. Descriptive analysis of the study data

3.5.1. The readiness of the bank

Table 7 shows a summary of the arithmetic averages and the relative importance of the bank's readiness and its dimensions, as it shows the average level of readiness of Jordanian commercial banks, with an arithmetic average of 3.467, and as for the dimensions, they came with intermediate relative importance for both administrative readiness, professional readiness, and organizational readiness, and they came with high relative importance. For legislative readiness, the highest arithmetic average for the legislative readiness dimension was 3.688, with a high degree. While the lowest arithmetic mean of professional readiness was 3.234, with an intermediate degree.

Table 7. Arithmetic averages and the relative importance of the bank's readiness and its dimensions

Bank's readiness dimensions	*Mean*	*Rank*	*Relative importance*
Administrative readiness	3.543	2	Intermediate
Professional readiness	3.234	4	Intermediate
Organizational readiness	3.404	3	Intermediate
Legislative readiness	3.688	1	High
Bank readiness	3.467	0	Intermediate

3.5.2. Blockchain technology

Table 8 shows a summary of the arithmetic averages and the relative importance of blockchain technology and its dimensions, where the average level of blockchain technology in the Jordanian commercial banks was shown, with an arithmetic average of 3.355, and for the dimensions, all of them came with medium relative importance, and the highest arithmetic average was for the use of block technology, which amounted to 3.492 at an intermediate degree, while the lowest arithmetic average for the dimension of the information was 3.141 and at a medium degree as well.

Table 8. Arithmetic averages and the relative importance of blockchain technology and its dimensions

Blockchain technology dimensions	*Mean*	*Rank*	*Relative importance*
Use of blockchain technology	3.492	1	Intermediate
The hash	3.485	2	Intermediate
Information	3.141	4	Intermediate
Time imprint	3.305	3	Intermediate
Blockchain technology	3.355		Intermediate

4. HYPOTHESIS TESTING

Main hypothesis:
H_0: *There is no statistically significant impact at a significant level $\alpha \leq 0.05$ of bank readiness in its dimensions in the blockchain technology in its dimensions in Jordanian commercial banks.*

Table 9 shows the results of the multiple regression analysis of the bank's readiness with its dimensions (administrative readiness, professional readiness, organizational readiness, and legislative readiness) of the blockchain technology with its dimensions (the use of blockchain technology, hash, information, and time imprint) in Jordanian commercial banks, where the value of correlation coefficient ($R = 0.855$) This indicates a relationship between the readiness of the bank and the blockchain technology. While the value of the coefficient of determination was ($R^2 = 0.730$), which means that the bank's readiness explained 73.0% of the variance in the blockchain technology, and the value of F was 71.730 at a significant level of Sig. = 0.000, and this confirms the significance of the regression. At the level of significance $\alpha \leq 0.05$, which indicates a statistically significant effect of the bank's readiness in the blockchain technology.

Table 9. The impact of bank readiness on blockchain technology

Dependent variable	*Independent variable*	*Unstandardized coefficients*		*Standardized coefficients*		
		B coefficient	*Standard error*	*β coefficient*	*T calculated*	*Sig. T*
Blockchain technology	*Administrative readiness*	0.581	0.104	0.683	5.589	0.000
	Professional readiness	0.136	0.067	0.154	2.038	0.044
	Organizational readiness	0.977	0.157	0.930	6.244	0.000
	Legislative readiness	0.639	0.141	0.674	4.539	0.000
Correlation coefficient R			*Coefficient of determination R²*	*Calculated F*	*Sig. F*	
0.855			0.730	71.730	0.000	

The coefficient table also shows that there is an effect of the bank's readiness dimensions in the blockchain technology, where the B-value for the administrative readiness dimension was 0.581, with a standard error of 0.104, and the Beta value was $\beta = 0.683$ and the T-value was 5.589 at the level of significance Sig. = 0.000 with a statistically significant level and the B-value for the dimension of professional readiness was 0.136 and standard error (0.067), and the Beta value was $\beta = 0.154$ and

the T-value was 2.038 at the level of significance Sig. = 0.044 and at a statistically significant level. The value of B for the dimension of organizational readiness was 0.977 with a standard error of 0.157, and the value of Beta was β = 0.930 and the value of T was 6.244, at the level of significance Sig. = 0.000 and at a statistically significant level, while the value of B for the dimension of legislative readiness was 0.639. And standard error was 0.141, the value of Beta was β = 0.974, and the value of T was 4.539, at the level of significance Sig. = 0.000, and at

a significant level of statistical significance. Based on the results of multiple regression analysis, it is not possible to accept the main null hypothesis (H_0) and accept the alternative hypothesis which states the following: *There is a statistically significant impact at a significant level α ≤ 0.05 of bank readiness in its dimensions in the blockchain technology in its dimensions in Jordanian commercial banks.*

To determine the most prominent dimensions of bank readiness that have an impact on blockchain technology, gradient regression analysis was used.

Table 10. Ranking the dimensions of the bank's readiness in terms of the impact on the blockchain technology

Model	Bank readiness	B	T calculated	Sig. F	Coefficient of determination R^2	Calculated F	Sig. T
First	Organizational readiness	0.837	13.764	0.000	0.635	189.466	0.000
Second	Organizational readiness	0.462	3.774	0.000	0.672	110.420	0.000
	Administrative readiness	0.343	3.479	0.001			
Third	Organizational readiness	0.846	5.846	0.000	0.720	91.558	0.000
	Administrative readiness	0.562	5.353	0.000			
	Legislative readiness	0.609	4.284	0.000			
Fourth	Organizational readiness	0.977	6.244	0.000	0.730	71.730	0.000
	Administrative readiness	0.581	5.589	0.000			
	Legislative readiness	0.639	4.539	0.000			
	Professional readiness	0.136	2.038	0.044			

Table 10 shows the results of the gradual regression analysis of the order of entry of the variables into the regression model that represents the effect of the bank's readiness in blockchain technology, where it was found that *Organizational readiness* came in first place, and explained 63.5% of the variance in the blockchain technology. When adding *Administrative readiness*, the interpretation rate increased to reach 67.2%, and the addition of *Legislative readiness* led to

an increase in the interpretation rate to reach 72.0%, while adding *Professional readiness* led to an increase in the interpretation rate to 73.0%. It is clear that the effect of all independent variables was significant at a significance level of less than 0.05.

The first sub-hypothesis:

H_{01}: There is no statistically significant impact at the level of significance α ≤ 0.05 for administrative readiness in the blockchain technology in Jordanian commercial banks.

Table 11. The impact of administrative readiness on blockchain technology

Dependent variable	Independent variable	Unstandardized coefficients		Standardized coefficients		
		B coefficient	Standard error	β coefficient	T calculated	Sig. T
Blockchain technology	Administrative readiness	0.674	0.050	0.793	13.572	0.000
Correlation coefficient R			Coefficient of determination R^2	Calculated F		Sig. F
0.793			0.628	184.208		0.000

Table 11 shows the results of a simple regression analysis of the impact of *Administrative readiness* on *Blockchain technology* in Jordanian commercial banks, where the value of the correlation coefficient was R = 0.793, and this indicates the existence of a relationship between administrative readiness and blockchain technology. While the value of the coefficient of determination was R^2 = 0.628, which means that the administrative readiness explained 62.8% of the variance in the blockchain technology, and the value of F was 184.208 at a significant level of Sig. = 0.000, and this confirms the significance of the regression. At the level of significance of α ≤ 0.05, which indicates a statistically significant effect of administrative readiness in blockchain technology.

The coefficients table also shows that there is an effect of the administrative readiness dimension

in the blockchain technology, where the B-value for the administrative readiness dimension was 0.674 with a standard error of 0.050, and the Beta value was β = 0.793 and the T-value was 13.572 at the level of significance Sig. = 0.000. Based on the results of simple regression analysis, it is not possible to accept the first sub-null hypothesis (H_{01}) and accept the alternative hypothesis, which states the following: *There is a statistically significant impact at the level of significance α ≤ 0.05 for administrative readiness in the blockchain technology in Jordanian commercial banks.*

Second sub-hypothesis:

H_{02}: There is no statistically significant impact at the level of significance α ≤ 0.05 for professional readiness in blockchain technology in Jordanian commercial banks.

Table 12. The impact of professional readiness on blockchain technology

Dependent variable	Independent variable	Unstandardized coefficients		Standardized coefficients		
		B coefficient	Standard error	β coefficient	T calculated	Sig. T
Blockchain technology	Professional readiness	0.479	0.071	0.544	6.671	0.000
Correlation coefficient R			Coefficient of determination R²	Calculated F	Sig. F	
0.544			0.295	45.712	0.000	

Table 12 shows the results of a simple regression analysis of the impact of *Professional readiness* on *Blockchain technology* in Jordanian commercial banks, where the value of the correlation coefficient was R = 0.544, and this indicates the existence of a relationship between professional readiness and blockchain technology. While the value of the coefficient of determination was R² = 0.295, which means that professional readiness explained 29.5% of the variance in blockchain technology, and the value of F was 45.712 at a significant level of Sig. = 0.000, and this confirms the significance of the regression. The level of significance α ≤ 0.05, indicates a statistically significant effect of professional readiness in blockchain technology.

The coefficients table also shows that there is an effect on the dimension of professional readiness in the blockchain technology, where the value of B for the dimension of professional readiness was 0.479 with a standard error of 0.071, and the value of Beta was β = 0.544 and the value of T was 6.761 at the level of significance Sig. = 0.000. Based on the results of simple regression analysis, it is not possible to accept the second sub-null hypothesis (H_{02}) and accept the alternative hypothesis, which states the following: *There is a statistically significant impact at a significant level α ≤ 0.05 for professional readiness in the blockchain technology in Jordanian commercial banks.*

The third sub-hypothesis:

H_{03}: *There is no statistically significant impact at the level of significance α ≤ 0.05 for organizational readiness in the blockchain technology in Jordanian commercial banks.*

Table 13. The impact of organizational readiness in blockchain technology

Dependent variable	Independent variable	Unstandardized coefficients		Standardized coefficients		
		B coefficient	Standard error	β coefficient	T calculated	Sig. T
Blockchain technology	Organizational readiness	0.837	0.061	0.797	13.764	0.000
Correlation coefficient R			Coefficient of determination R²	Calculated F	Sig. F	
0.797			0.635	189.446	0.000	

Table 13 shows the results of a simple regression analysis of the impact of *Organizational readiness* on *Blockchain technology* in Jordanian commercial banks, where the value of the correlation coefficient was R = 0.797, and this indicates the existence of a relationship between organizational readiness and blockchain technology. While the value of the coefficient of determination was R² = 0.635, which means that organizational readiness explained 63.5% of the variance in blockchain technology, and the value of F was 189.446 at a significant level of Sig. = 0.000, and this confirms the significance of the regression. At the level of significance α ≤ 0.05, which indicates a statistically significant effect of organizational readiness in blockchain technology.

The coefficients table also shows that there is an effect of the organizational readiness dimension in the blockchain technology, where the B-value for the organizational readiness dimension was 0.837 with a standard error of 0.061, and the Beta value was β = 0.797 and the T-value was 13.764 at the level of significance of Sig. = 0.000. Based on the results of simple regression analysis, it is not possible to accept the third sub-null hypothesis (H_{03}) and accept the alternative hypothesis, which states the following: *There is a statistically significant impact at a significant level α ≤ 0.05 for organizational readiness in the blockchain technology in Jordanian commercial banks.*

Fourth sub-hypothesis:

H_{04}: *There is no statistically significant impact at the level of significance α ≤ 0.05 for legislative readiness in blockchain technology in Jordanian commercial banks.*

Table 14. The effect of legislative readiness on blockchain technology

Dependent variable	Independent variable	Unstandardized coefficients		Standardized coefficients		
		B coefficient	Standard error	β coefficient	T calculated	Sig. T
Blockchain technology	Legislative readiness	0.659	0.065	0.695	10.089	0.000
Correlation coefficient R			Coefficient of determination R²	Calculated F	Sig. F	
0.695			0.483	101.778	0.000	

Table 14 shows the results of a simple regression analysis of the impact of *Legislative readiness* on *Blockchain technology* in Jordanian commercial banks, where the value of the correlation coefficient was R = 0.695, and this indicates the existence of a relationship between legislative readiness and blockchain technology. While the value of the coefficient of determination was R² = 0.483, which means that the legislative readiness explained the percentage of 48.3% of the variance in blockchain technology, and the value of F was 101.778 at a significant level of Sig. = 0.000,

and this confirms the significance of the regression. At the level of significance of $\alpha \leq 0.05$, which indicates a statistically significant effect of legislative readiness in blockchain technology.

The coefficients table also shows that there is an effect of the legislative readiness dimension in blockchain technology, where the B-value for the legislative readiness dimension was 0.659 with a standard error of 0.065 and the Beta value was $\beta = 0.695$ and the T-value was 10.089 at the level of significance of Sig. = 0.000. Based on the results of simple regression analysis, it is not possible to accept the fourth sub-null hypothesis (H_{04}) and accept the alternative hypothesis, which states the following: *There is a statistically significant impact at the level of significance $\alpha \leq 0.05$ for legislative readiness in the blockchain technology in Jordanian commercial banks.*

5. DISCUSSION

The results of the analysis showed the average level of readiness of Jordanian commercial banks, and it was shown that the average level of their readiness in terms of administrative, organizational, and professional terms, respectively, while it was shown that the level of their readiness was high in legislative terms.

The results of the analysis showed the intermediate level of the relative importance of blockchain technology in Jordanian commercial banks, and the intermediate level of the relative importance of its dimensions (the use of blockchain technology, the hash, the time imprint, and the information) was shown, respectively.

The results of the main hypothesis test showed that there is a statistically significant effect of the bank's readiness in its dimensions (administrative readiness, professional readiness, organizational readiness, and legislative readiness) in blockchain technology with its dimensions (the use of blockchain technology, hashing, information, and time imprint) in Jordanian commercial banks.

The results of the multiple regression analysis of the main hypothesis showed that the dimension of organizational readiness is one of the most prominent dimensions of bank readiness influencing blockchain technology, followed by administrative readiness, then legislative readiness, and finally professional readiness.

6. CONCLUSION

The purpose of this paper was to lay the foundation for future research into blockchain technology and its implementation in the banking sector in developing countries, particularly Jordan. As a result, this paper can be considered the beginning of a variety of research domains that will ultimately analyze all of the different dimensions of blockchain technology and how it is applied to the banking sector and accepted by banks. Researchers may want to focus their attention more on the changes blockchain brings to the banking sector, while economists may want to investigate the implications for the entire economy or needed policy changes. Digital transformation is increasingly accelerating developments in many economies and industries, similar phenomena are likely to similarly shape other industries.

The results of testing the hypotheses showed a statistically significant effect of administrative readiness, professional readiness, organizational readiness, and legislative readiness in blockchain technology in Jordanian commercial banks when studied individually. The limitations of this study involve the sample selection, which this study focused on the Jordanian banks' sector; we recommend that future researchers chose a wider sample from different sectors.

Based on the findings, the study recommends the following:

1. Providing all requirements that contribute to achieving the administrative readiness of Jordanian commercial banks for the application of blockchain technology, in terms of conducting periodic, continuous, and organized evaluations of the performance of the work of the blockchain technology with the aim of verifying the efficiency of their operations and subjecting the bank to its activities and business for continuous monitoring and supervision. This reflects positively on the level of development and quality of the bank and works to provide services that are compatible with the expectations and aspirations of customers, which ensures the achievement of customer satisfaction and thus maintains them, in addition to encouraging and motivating employees to accept change and development and prepare to keep pace with transformations in work, and to identify the training needs and requirements of employees for them. Especially, in the field of modern technologies, and providing training programs that comply with the new work requirements, in addition to relying on the outputs of the evaluation process in addressing their weaknesses and shortcomings.

2. Providing all requirements that contribute to achieving the readiness of Jordanian commercial banks in terms of the humiliating aspect of applying blockchain technology, in terms of verifying the validity of the available information, the availability of trained and practically qualified human cadres, and adopting methods and procedures aimed at raising their efficiency by motivating them to participate in seminars and conferences and courses related to work development and participation in training programs and workshops aimed at increasing their competencies and skills. In addition, to rely on effective communication channels that contribute to the exchange of information and experiences in the field of the bank's activities and operations, and work to keep abreast of developments and changes in the field of banking.

3. Providing all requirements that contribute to achieving the organizational readiness of Jordanian commercial banks for the application of blockchain technology, in terms of adopting an organizational structure that is flexible and subject to modification, and clarifies all departments, sub-units, and main and the nature of the relationship between them, and provides adequate support in planning, monitoring and follow-up processes, executing activities and operations. In addition to relying on a working manual that clarifies the tasks, responsibilities, limits, and powers granted to employees, formulating plans, policies, and procedures that help in achieving organizational goals, and facing problems and deviations in work quickly and immediately.

4. Providing all requirements that contribute to achieving the legislative readiness of Jordanian commercial banks to implement blockchain technology, in terms of relying on clear and specific bases in the process of hiring employees and attracting employees who have the highest levels of experience, skill, scientific and practical competence in banking, and a commitment to implement all legislations related to the practice of the banking profession.

5. For Jordanian commercial banks to conduct a continuous updating process on the data within the block, apply periodic tests on the block operations to verify that there are no gaps in the chain, and follow supervisory practices to prevent any incorrect transactions from being saved in their digital block.

6. Using systems and technologies that have the ability to mine the correct and distinct hash of transactions, verify the completion of transactions and include them within the chain after obtaining the correct hash, apply appropriate algorithms to formulate the appropriate hash from the first time, and follow appropriate security procedures and controls to prevent access to the encryption key of transactions. Preserving data stored in a blockchain and reducing fraud, forgery, and data manipulation.

7. Adopting practices and procedures that contribute to the validation of the processes on the chain with those in reality and help to complete the processes within the blocks with accuracy and high efficiency and conduct comprehensive and continuous checks and evaluations of the transactions that take place in the blocks.

8. Conducting a periodic and continuous updating and development process on the time imprint systems, which enhances confidence in the use of blockchain technology, accurately determines the time of the process within the chain and activates the role of time imprinting as a digital authentication that provides confirmation of the validity and integrity of transactions that take place within the block.

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