Securing Management Information Systems Using Blockchain Technology

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Abstract

This study aims to present the basic principles of blockchain technology that has received the attention of various sectors, including the higher education sector, which studies the application of these technologies to improve information traceability, accountability, and integrity, while ensuring privacy, transparency, durability, trustworthiness, and authenticity. Various interesting proposals and projects launched and being developed, including verification of digital certificates. Through this study, we are building a digital certificate validation system that overcomes the limitations of paper-based digital certificates and non-blockchain-based digital certificates. It explains how to verify a certificate and gives a new idea to create a certificate in the most secure and tamper-resistant way using blockchain technology.

Keywords: Blockchain; Encryption; Management information systems

1- Introduction

The prominent role of knowledge has led to the emergence of societies called knowledge societies, based on knowledge, and keeping pace with the rapid technological transformations the world is witnessing, whether by using new technologies, or updating and upgrading existing programs and technologies, in addition to contributing to the emergence of modern terms in this aspect as the term digital transformation. There are many concepts of the term digital transformation, which can be considered a phenomenon resulting from a group of modern digital technologies operating simultaneously, including computers, artificial intelligence, cloud computing, and others. As digital transformation leads to the production of large and new amounts of information, it can contribute to decision-making and strategic planning (Lanzolla G.et al, 2018).

It can be defined as the use of information and communication technology with the aim of developing institutional performance, and increasing effectiveness and efficiency in the level of government services provision through the use of modern and renewable technologies (Ministry of Technology and Communications, 2019)

In line with the Fourth Industrial Revolution, and its modern and effective technologies in improving performance and quality of work, countries have tended to adapt and use these technologies to suit their multiple needs, in addition to innovative technology. Among the most prominent features of this revolution are cloud computing, broadband, blockchain technology, artificial intelligence, and the Internet of Things. The use of the technologies of the Fourth Industrial Revolution was not limited to companies or private institutions, but rather to the government sector. Its institutions took the initiative to use it. (Romero, D., et al., 2016)

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Education also has an important place in all developed countries around the world. It is also considered the main axis of progress and development in the lives of individuals and societies. Education is not only limited to school, but also includes a range of the most important areas that affect the future of the country, including industry, medicine, agriculture, science and others. (Al-Amri, M, 2019).

Attention has begun to turn towards this technology, which has proven successful, and many attempts have been made to exploit it in several areas, including the field of higher education. Although block chain technology has been around for 10 years. It should be noted that there are many technologies that can be employed to raise the efficiency of the workforce, educate and train them to solve problems in the field of education, whether it is governmental or private education. This tool contributes to the formation of a radical solution to many of the problems it may face. Method of education process. The regions share a close relationship with education and its levels in the country. (Al-Amri, M, 2019).

A blockchain is a database distributed across the network over alarge number of computers, and when a record is sent to this database, it is difficult to change, and to ensure that all copies of the database are compatible and identical, the network runs continuously checks, and the block uses Chin mainly for digital currencies Especially Bitcoin. (Atlam, H.F., 2016).

The importance of blockchain in educational fields is summarized in the following: Getting rid of paper documents in general, which reduces the possibility of paper fraud and loss. Maintaining official approved certificates and protecting them from loss. Easy access to information if the owner authorizes the user to do so. Choosing experienced and qualified people transparently to fill the appropriate positions for them. Not to inform unauthorized persons of accessing or viewing the data, thus the privacy of the data is kept and stored for the applicant or its owner. Blockchain in the education sector is a tool to facilitate the process of keeping documents for educational institutions, and to get rid of documents piled up in shelves. The ability to make some modifications to confidential and undetectable transactions, with all privacy in educational institutions.(Lezcano ,D.et al., 2020).

2- The study problem

Databases are of great importance for the progress of any society that plans to build its future on sound scientific and technical frameworks, especially as we live in an era in which many variables are controlled based on important data, whether economic, social, or other. Setting development plans, whether short-term or long-term, cannot take place without a basic foundation upon which to build, and here we mean sound databases.

Through the researcher's meeting with the officials of the Technology Center at Mansoura University, and talking about the systems that the university depends on (Al-Farabi - Ibn Al-Haytham - Al-Mustaqbal..) it was found that they depend on the traditional digital databases that need (space, memory, maintenance, modification, .. etc.) The following are insulted:-

- Storing them on specific servers exposes them to potential data loss

-The database has stopped for any reason, which prevents all users from dealing with it.

-Insurance programs are financially costly, difficult to design, and require highly educated and trained personnel

The interview conducted by the researcher also explained the weaknesses in the current digital systems related to educational services, and they can be identified as follows:

-He found it difficult to store academic data for institutions of higher education.

-There is a difficulty in not facilitating the access of students to transcripts and certificates that are documented internally and externally.

-The difficulty of contributing to the administration of government grants and aid to students and paying tuition fees.

-The difficulty of issuing certificates and cards to university institutions, especially with regard to international students, who incur the trouble of sending them, which is expensive and takes a long time.

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Hence, educational institutions lack a security system that relies on encryption to provide reliable electronic applications that suit the needs of users in ensuring the preservation and storage of their information for long or short periods.

Therefore, interest began to turn towards the blockchain technology, which has proven successful, and many attempts to exploit it in several areas, including the field of higher education.

The current study has proven the success of the use of blockchain technology in education in terms of how to use the multiple capabilities and their benefits. Blockchain in education management: present and future applications.

This study aims to provide a systematic literature review on blockchain technology in education to offer a detailed understanding of the present scenario in terms of benefits, barriers, present blockchain technology application and future areas where blockchain technology can be implemented in the other fields of education.

A bibliometric analysis is conducted on for data in the publications, journals, authors and citations were collected, and examined by applying bibliometric measures. The data was collected from SCOPUS database on the topic "Blockchain Technology in Education". The following research questions guided this systematic literature review (SLR: How blockchain technology has been defined in educational settings? How were the technology examined (i.e. the methodology)? What were the results of using this technology in an education system؟

The study identifies the benefits, barriers and present application of blockchain technology in education. The analysis shows that blockchain technology in education is still a young discipline, but has a lot of potential to benefits the educational sector at large.

This research provides groundwork for education institutions, the policymakers and researchers to explore other areas where blockchain technology can be implemented, though this research has also suggested some prospective uses of blockchain technology in different functions of an education system, more application can be brought into the education system to exploit the potential of blockchain technology.

The paper discusses the application of blockchain technology in education with the help of bibliometric analysis. This is one of the first known studies to review the blockchain technology by identifying its benefits, barriers, present blockchain technology application. Based on the analysis, future application areas are also identified. (Bhaskar, P.,2020).

3- The Study Questions

The study problem can be formulated in the following main question:

How could develop a cryptione system based on the use of Blockchain technology to manage management information systems?

The answer to this question yield to the answer of the following sub question:

1-What are the foundations and criteria for developing a cryptographic system based on the use of blockchain technology to manage management information systems?

2-What is the proposed design for the encryption resulting from the use of Block chain technology to develop management information systems?

3- What is the impact of the proposed encryption system based on blockchain technology in the development of management information systems in Egyptian Universities?

4- What are the opinions of graduates, computer experts and stakeholders towards using the proposed cryptographic system based on blockchain technology in the development of the management information system?

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4- Study Objectives

The objective of this study is develop an encryption technology to many emit information system.

The system aimed to achieve the following sub- objectives:

1-laying the foundation and criteria for the development of a proposed encryption system based on the use of blockchain technology to develop administration information systems.

2-Providing proposed scenario to develop proposed encryption system .

3-Designing a proposed coding system based on Blockchain technology to manage management information systems.

4- Measuring the impact of the proposed system in helping and developing the skills of those managing management information systems.

5- Measuring the effectiveness of the proposed encryption system based on blockchain in developing management information system

6-Developing the skills of employees within educational institutions in verifying the validity of digital graduation certificates.

7- Getting to know the opinions of graduates, computer experts and stack holders to wards using the proposed encryption system based on blockchain technology and its roles in developing administrative information system in Egyptian universities

5- The Study Importance

The importance of this study stems from the fact that it may contribute to:

1-Informing researchers in educational institutions with Block chain technology.

2-The introduction of Block chain technology in the field of education is the focus of researchers' attention.

3-An attempt to gain knowledge for everyone who wants to learn about the nature of Block Chain Technology and its importance.

4-Helping in defining the foundations needed to build an electronic system based on Block Chain Technology to manage management information systems.

5-Validating digital graduation certificates using blockchain technology.

6-The program worked to facilitate educational institutions to verify the validity of digital graduation certificates.

7-Identify the nature of the blockchain and its importance in securing and encrypting data within educational institutions.

6- The Study Terminology

1-Blockchain technology

The research defines it p procedurally as : It is an information network that contains a group of devices, each of which represents a database, where all transactions that take place within the network are preserved, and every transaction that takes place between two devices is subject to verification, and confirmation of its validity by the rest of the network devices.

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2-Encryption

The research defines it procedurally as follows: Changing the form of data by converting it into codes aimed at protecting graduates' data (graduation certificates) from being accessed or modified..

4-Management information systems

MIS is an organized way of presenting past and present information related to internal processes and external effects. Information systems support the planning, management, and project activities within the Family Planning Association, providing appropriate information at the scheduled time to effectively contribute to decision-making. (Messina, D et al., 2020)

The research defines it p procedurally as: A group of elements related to each other and the purpose of which is to collect information about a particular thing in order to serve the entire organization and its activities. There are several general characteristics that describe the framework of any successful information system, which are the accuracy, validity and independence of the system and its comprehensive use by the various beneficiary individuals in a way that supports the system and improves its quality.

7- The Study hypotheses

The main hypothesis of this study can be stated as follows:

There is an effectiveness of the proposed Encryption system based on using Blockchain Technology for management of information system.

A number of sub- hypotheses are derived from this hypothesis:

1-There are no statistically significant differences at level (0.05) between the opinions of graduates, computer experts and stakeholders in the results of the observation card with regard to the accuracy of the proposed encryption system.

2- There are no statistically significant differences at level (0.05) between the opinions of graduates, computer experts and stakeholders in the results of the observation card with regard to speed in the proposed encryption system.

3- There are no statistically significant differences at level (0.05) between the opinions of graduates, computer experts and stakeholders in the results of the observation card with regard to the percentage of error in the proposed encryption system.

4- There are no statistically significant differences at level (0.05) between the opinions of graduates, computer experts and stakeholders about the positivity of the proposed coding system in the development of information systems management.

8- Study Approach

The study uses both the descriptive method and the experimental methodology,

Where:

1-Descriptive approach: to identify the concept of block chain to find out the actual reality of the use of block chain technology.

2-The experimental approach: developing the proposed system for the current study and measuring its accuracy, speed in providing the optimal solution in information systems management in Egyptian universities

9- Study tools

1-A questionnaire to lay the foundations and standards for the proposed encryption system based on blockchain technology.

2- Encryption system proposed by research and based on blockchain

3-A note card for the technical aspects of the proposed encryption system (accuracy – speed – error rate)

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4-Attitude measure to know the opinions of graduates, computers experts and stakeholders towards the proposed encryption system based on blockchain technology and its role in managing information systems.

10- The proposed system

The proposed system was developed using the programming language and the system consisted of 8 main screens. The following screen is displayed for the system:
The main screen of the system through which you can search for a certificate and verify its authenticity without logging into the system, as follows

Figure 1: main window main window

To register access to the system, press the login button as before, a window appears that selects the university name, as follows:

Figure 2: University selection screen

System consists of five main processes

1- adding a new graduate,
2- looking for a graduate,
3- extracting a new certificate،
4- verifying a previously certificate،
5- E-mail system.

11- **Field study and research tools**

In continuation of what was presented and analyzed in the previous axes regarding a cryptographic system based on the use of Blockchain technology to manage management information systems, and then this chapter aims to extrapolate the groups that represent the community and the study sample. To measure the accuracy, speed and percentage of program errors, and in order to test the study hypotheses in a practical way, this chapter addresses the following topics:

1-The nature and methodology of the field survey, including (the study sample, the statistical analysis methods used).

2- List of criteria.

3- Evaluate the proposed system

4- The statistical analysis tools used

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The following is a detailed presentation of these themes as follows:

First: The nature and methodology of the field survey:

1- Study population and sample:

The study sample consists of three categories that include graduates, arbitrators, and stakeholders. Since these categories are closely related to the research variables, a sample of 91 individuals was identified and the researcher collected the necessary data to test the research hypotheses. The following table ( ) reflects the classification of the study sample. A set of criteria has been set in Appendix No. 2

The study sample

Table 1: Sample

Type	No	Percent
Graduates	**30**	**32.97**
Experts	**29**	**31.87**
Stakeholders	**32**	**35.16**
Total	**91**	**100**

Hypotheses

1. There are no statistically significant differences between the opinions of graduates, computer experts and stakeholders in the results of the observation card with regard to the accuracy of the current system.
2. There are no statistically significant differences between the opinions of graduates, computer experts and stakeholders in the results of the observation card with regard to speed in the current system.
3. There are no statistically significant differences between the opinions of graduates, computer experts and stakeholders in the results of the observation card with regard to the percentage of error in the current system.
4. There are no statistically significant differences between the opinions of graduates, computer experts and stakeholders about the positivity of the proposed coding system in the development of information systems management.

The first hypothesis

There are no statistically significant differences between the opinions of graduates, computer experts and stakeholders in the results of the observation card with regard to the accuracy of the current system.

To statistically validate the hypothesis, the One-Way ANOVA was used to determine the significance of the differences, following table shown this:

Table 2: results of the observation card with regard to the accuracy of the current system

Phase	Source	Sum of Squares	df	Mean Square	F	Sig
Accuracy	Between Groups	1.877	2	0.938	1.421	0.247
	Within Groups	58.123	88	0.660		Not significant
	Total	60.000	90			
$\alpha \leq 0.05$						

As shown in table (2), there are no statistically significant differences at level (0.05) between the opinions of graduates, computer experts and stakeholders in the results of the observation card with regard to the accuracy of the current system.

The second hypothesis

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There are no statistically significant differences between the opinions of graduates, computer experts and stakeholders in the results of the observation card with regard to speed in the current system.

To statistically validate the hypothesis, the One-Way ANOVA was used to determine the significance of the differences, following table shown this:

Table 3: results of the observation card with regard to speed in the current system.

Phase	Source	Sum of Squares	df	Mean Square	F	Sig
Speed	Between Groups	0.285	2	0.143	0.229	0.795
	Within Groups	54.704	88	0.622		Not significant
	Total	54.989	90			
$\alpha \leq 0.05$						

As shown in table (3), there are no statistically significant differences at level (0.05) between the opinions of graduates, computer experts and stakeholders in the results of the observation card with regard to speed in the current system.

The third hypothesis

There are no statistically significant differences between the opinions of graduates, computer experts and stakeholders in the results of the observation card with regard to the percentage of error in the current system.

To statistically validate the hypothesis, the One-Way ANOVA was used to determine the significance of the differences, following table shown this:

Table 4: results of the observation card with regard to the percentage of error in the current system.

Phase	Source	Sum of Squares	df	Mean Square	F	Sig
Error	Between Groups	1.540	2	0.770	1.145	0.323
	Within Groups	59.185	88	0.673		Not significant
	Total	60.725	90			
$\alpha \leq 0.05$						

As shown in table (4), there are no statistically significant differences at level (0.05) between the opinions of graduates, computer experts and stakeholders in the results of the observation card with regard to the percentage of error in the current system.

The fourth hypothesis

There are no statistically significant differences between the opinions of graduates, computer experts and stakeholders about the positivity of the proposed coding system in the development of information systems management.

To statistically validate the hypothesis, the One-Way ANOVA was used to determine the significance of the differences, following table shown this:

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Table 5: the positivity of the proposed coding system in the development of information systems management.

Phase	Source	Sum of Squares	df	Mean Square	F	Sig
Systems	Between Groups	0.109	2	0.054	0.212	0.809
	Within Groups	22.616	88	0.257		Not significant
	Total	22.725	90			
$\alpha \leq 0.05$						

As shown in table (5), there are no statistically significant differences at level (0.05) between the opinions of graduates, computer experts and stakeholders about the positivity of the proposed coding system in the development of information systems management.

Second: List of criteria.

The list of criteria was made by reviewing previous research and studies, and it was presented to the arbitrators.Their number was(11) and their names Appendix No. (1), and after making the required modifications, the list became in the final form, which is 20 questions Appendix No. (3)
The scale was applied by a group of experts and arbitrators in the field (n=11) to learn their opinions about the proposed system .Their response was determined on a scale (efficiency of the proposed system) according to the triple estimate (Greatly convenient- Medium suitable- Inappropriate) a continuous scale (3, 2, 1).

x^2 Was used and tables from (1) to (4) x^2 values for repeats of the response of experts and specialists to the scale items for evaluating the proposed system were clarified

Table 6: Results of the proposed system arbitration in accordance with (The main Diagram), n= (11).

Evaluation criteria	Degree of availability of the standard						x^2
	Greatly convenient		Medium suitable		Inappropriate		
	#	%	#	%	#	%	
Explains program design steps	10	90.9	1	9.1	0	0	16.545
The layout design steps are consistent with the program	6	54.5	5	45.5	0	0	5.636
The layout is clear and easy to understand	11	100	0	0	0	0	22
The planner achieves the goal set for it	11	100	0	0	0	0	22
d.f = 2							

From the previous table, it is clear that there are statistically significant differences between choices (Greatly convenient- Medium suitable- Inappropriate) to formulate axis sentences (Main Diagram) in favour of selection (Greatly convenient) in all sentences. This demonstrates the extent to which experts and arbitrators have agreed on the efficiency of the (Main Diagram).

Table 7: Results of the proposed system arbitration in accordance with (Analysis Diagram), n= (11).

Evaluation criteria	Degree of availability of the standard						X^2
	Greatly convenient		Medium suitable		inappropriate		
	#	%	#	%	#	%	
There is a high degree of safety in obtaining certificates	8	72.7	3	27.3	0	0	8.909
Its steps are characterized by ease and simplicity	11	100	0	0	0	0	22
Feedback loop available	9	81.8	2	18.2	0	0	12.182
The diagram shows the steps for obtaining the certificate	9	81.8	2	18.2	0	0	12.182
d.f = 2							

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From the previous table, it is clear that there are statistically significant differences between choices (Greatly convenient- Medium suitable- Inappropriate) to formulate axis sentences (Analysis Diagram) in favour of selection (Greatly convenient) in all sentences. This demonstrates the extent to which experts and arbitrators have agreed on the efficiency of the (Analysis Diagram).

Table 8: Results of the proposed system arbitration in accordance with (Design Diagram), n= (11).

Evaluation criteria	Degree of availability of the standard						X^2
	Greatly convenient		Medium suitable		inappropriate		
	#	%	#	%	#	%	
The scheme achieves its main objective of securing and encrypting certificates	9	81.8	2	18.2	0	0	12.182
The diagram illustrates the block chain steps for the proposed system	8	72.7	3	27.3	0	0	8.909
The plan shows the possibility of issuing safe, easy and documented certificates	11	100	0	0	0	0	22
It provides an iterative loop to get feedback	9	81.8	2	18.2	0	0	12.182
Allows the privacy of dealing with the program	7	63.6	4	36.4	0	0	6.727
It has a high degree of encryption to secure the data	10	90.9	1	9.1	0	0	16.545
d.f = 2							

From the previous table, it is clear that there are statistically significant differences between choices (Greatly convenient- Medium suitable- Inappropriate) to formulate axis sentences (Design Diagram) in favour of selection (Greatly convenient) in all sentences. This demonstrates the extent to which experts and arbitrators have agreed on the efficiency of the (Design Diagram).

Table 9: Results of the proposed system arbitration in accordance with (Algorithm Diagram), n= (11).

Evaluation criteria	Degree of availability of the standard						X^2
	Greatly convenient		Medium suitable		inappropriate		
	#	%	#	%	#	%	
The diagram shows a method of coding using encryption algorithm (ASE)	10	90.9	1	9.1	0	0	16.545
It achieves a high degree of safety and privacy of using (ASE)	9	81.8	2	18.2	0	0	12.182
d.f = 2							

From the previous table, it is clear that there are statistically significant differences between choices (Greatly convenient- Medium suitable- Inappropriate) to formulate axis sentences (Algorithm Diagram) in favour of selection (Greatly convenient) in all sentences. This demonstrates the extent to which experts and arbitrators have agreed on the efficiency of the (Algorithm Diagram)

Table 10: Results of the proposed system arbitration in accordance with (Block chain diagram), n= (11).

Evaluation criteria	Degree of availability of the standard						X^2
	Greatly convenient		Medium suitable		inappropriate		
	#	%	#	%	#	%	
The diagram illustrates the block chain architecture	10	90.9	1	9.1	0	0	16.545
It demonstrates the possibility of encrypting data in more than one way within the block chain	8	72.7	3	27.3	0	0	8.909
d.f = 2							

From the previous table, it is clear that there are statistically significant differences between choices (Greatly convenient- Medium suitable- Inappropriate) to formulate axis sentences (Block chain diagram) in favour of selection (Greatly convenient) in all sentences. This demonstrates the extent to which experts and arbitrators have agreed on the efficiency of the (Block chain diagram).

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Table 11: Results of the proposed system arbitration in accordance with (The program interface), n= (11).

Evaluation criteria	Degree of availability of the standard						X^2
	Greatly convenient		Medium suitable		inappropriate		
	#	%	#	%	#	%	
It is characterized by ease of use	9	81.8	2	18.2	0	0	12.182
The interface of the software is visually appealing and comfortable	9	81.8	2	18.2	0	0	12.182
d.f = 2							

From the previous table, it is clear that there are statistically significant differences between choices (Greatly convenient- Medium suitable- Inappropriate) to formulate axis sentences (The program interface) in favour of selection (Greatly convenient) in all sentences. This demonstrates the extent to which experts and arbitrators have agreed on the efficiency of the (The program interface).

First: the veracity of the scale

The current research in verifying the validity of the scales depended on the method of content validity, where the scale was presented in its initial form to a number of arbitrator professors, in order to get to know their views on the scale in terms of the accuracy of the linguistic formulation of the scale's vocabulary, the integrity of the content, and the affiliation of the phrases included in each axis. And the sufficiency of the phrases contained in each axis to achieve the goal for which it was set. The aforementioned modifications have been made to the wording of some phrases, and some phrases have been deleted, thus being subject to the validity of the content.

Second: Scale stability

The stability coefficients of the scale were calculated using the Alpha Cronbach and split-half method, and the following tables illustrate this

Table 12: Stability coefficient for scale n = (9)

Number of phrases	Alpha coefficient	Split half	
		Cyberman	Getman
20	0.877	0.802	0.801

It is clear from the previous table that the values of stability coefficients (alpha - half-hinged, which include Saberman's coefficient, and Guttman's coefficient) are high, which confirms the scale's stability and validity for application in the current research

Third: the proposed system

The list of criteria was drawn up by reviewing previous research and studies and presented to the 11 arbitrators. After making the required modifications, the list became in the final form, which is (28) questions. Appendix No. (4) The validity and reliability coefficient were calculated after that.

The scale was applied by a group of experts and arbitrators in the field (n=11) to learn their opinions about the proposed system .Their response was determined on a scale (efficiency of the proposed system) according to the double estimate (Agree - Not Agree) a continuous scale (2, 1).

x^2 Was used and tables from (1) to (16) x^2 values for repeats of the response of experts and specialists to the scale items for evaluating the proposed system were clarified.

Table 13: Results of the proposed system arbitration in accordance with (The general form of the proposed system), n =(11).

Evaluation criteria	Degree of availability of the standard		x^2
	Agree	Not Agree	

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	#	%	#	%	
(App Icon) The proposed system icon is attractive for user.	10	90.9%	1	9.1%	7.364
The shape of the icon of the proposed system corresponds to its functional meaning.	11	100%	0	0%	11
The logo is used correctly in the interfaces of the proposed system.	11	100%	0	0%	11
The logo Appears on the interface of the proposed system to achieve reliability.	10	90.9%	1	9.1%	7.364
(fonts) Easy-to-read font size and style for user in the proposed system.	9	81.8%	2	18.2%	4.455
The writing style of the proposed system is familiar and clear.	11	100%	0	0%	11
Use high contrast between text and background in the proposed system.	11	100%	0	0%	11
The buttons are placed in the proposed system in the correct and familiar place for users.	11	100%	0	0%	11
(Buttons)The shape of the buttons is appropriate clarity of the function of the buttons in the proposed system through their shape.	9	81.8%	2	18.2%	4.455
The buttons are arranged in the suggested order in their logical sequential order.	11	100%	0	0%	11
The buttons are placed with a text label to make it easier for the user to understand their function.	11	100%	0	0%	11
Use correct color contrast between text and buttons.	10	90.9%	1	9.1%	7.364
The writing style is familiar and clear.	11	100%	0	0%	11
The proposed system is characterized by ease of use and flexibility to move between its screens.	11	100%	0	0%	11
Clarity of the certificate search tool on the interface of the proposed system.	9	81.8%	2	18.2%	4.455
The state of the buttons changes in the proposed system when you press them.	11	100%	0	0%	11
d. f: 1					

From the previous table, it is clear that there are statistically significant differences between choices (Agree - Not Agree) to formulate axis sentences (The general form of the proposed system) in favor of selection (Agree) in all sentences. This demonstrates the extent to which experts and arbitrators have agreed on the efficiency of the (The general form of the proposed system).

Table 14: Results of the proposed system arbitration in accordance with (Proposed system accuracy), n =(11).

Evaluation criteria	Degree of availability of the standard				x^2
	Agree		Not Agree		
	#	%	#	%	
The ability to send notifications when performing any operation within the Proposed system.	11	100%	0	0%	11
The ability to add and save a new Member within the Proposed system.	11	100%	0	0%	11
The ability to add and save a new graduate inside the system.	11	100%	0	0%	11
The Proposed system ability to detect data modifications (delete - add - hide).	10	90.9%	1	9.1%	7.364
The ability of the Proposed system to send notifications of tampering with certificates to subscribers within the system.	9	81.8%	2	18.2%	4.455
The ability of the Proposed system to exchange electronic messages between those registered within the system.	11	100%	0	0%	11
The ability of the Proposed system to achieve encryption and security of data.	11	100%	0	0%	11
The proposed system allows displaying the certificates data at any time, thus achieving transparency.	11	100%	0	0%	11
The process of searching for a certificate in the proposed system does not require an intermediary to complete the process.	10	90.9%	1	9.1%	7.364
The ability of the proposed system to achieve data security by storing it with	9	81.8%	2	18.2%	4.455

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Evaluation criteria	Degree of availability of the standard				x^2
	Agree		Not Agree		
	#	%	#	%	
many devices on a distributed network.					
The impossibility of electronic pinch or data change by simply registering within the proposed system, which achieves security and stability.	10	90.9%	1	9.1%	7.364
The proposed system includes a number to limit the number of times it has been downloaded.	11	100%	0	0%	11
d. f: 1					

From the previous table, it is clear that there are statistically significant differences between choices (Agree - Not Agree) to formulate axis sentences (Proposed system accuracy) in favor of selection (Agree) in all sentences. This demonstrates the extent to which experts and arbitrators have agreed on the efficiency of the (Proposed system accuracy).

First: the veracity of the scale

The current research in verifying the validity of the scales relied on the method of content validity, where the scale was presented in its initial form to a number of arbitrator professors, in order to identify their views on the scale in terms of the accuracy of the linguistic formulation of the scale's vocabulary, the integrity of the content, and the affiliation of the phrases included in each of its axis The sufficiency of the phrases contained in each axis to achieve the goal for which it was set, and the aforementioned modifications have been made to the wording of some phrases, and some phrases have been deleted, thus being subject to the validity of the content.

Second: Scale stability

The stability coefficients of the scale were calculated using the Alpha Cronbach and split-half method, and the following table illustrates this:

Table 15: Reliability Statistics

Axes	No of Items	Cronbach's Alpha	Split-half	
			Spearman	Guttman
The general form of the proposed system	16	0.944	0.926	0.923
Proposed system accuracy	12	0.964	0.830	0.829
All	26	0.937	0.949	0.938

It is clear from the previous table that the values of stability coefficients (alpha-half fragmentation, which include Saberman's coefficient, and Guttman's coefficient) are high, which confirms the scale's stability and validity for application in the current research.

Fourth: The statistical analysis tools used:

According to the nature of the data and the study methodology, the researcher relied on a set of statistical methods related to the SPSS program, and these methods are as follows:

1- Alpha Cronbach correlation coefficient
2- To statistically validate the hypothesis, one-way ANOVA was used to determine the significance of the differences.

12-the results

Within the framework of presenting and analyzing the main themes of the study and achieving its objectives, it is possible to presenting the study summary, presenting recommendations and future studies, and answering the study's questions as follows:

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Conclusion

This paper provides an overview for Securing Management Information Systems Using Blockchain Technology. The summary of the study and the results of the study can be listed as the following:

1- Easily and quickly certify educational documents at the university level without relying on the human element, automatically and reliably via blockchain technology.
2- Verify educational documents electronically via the Blockchain which can be considered as a huge and reliable data platform, thus rejecting any transaction containing fake or unreal data
3- The possibility of conducting transactions that take place between two far-flung parties directly, with very high credibility and security.
4- The application of Blockchain technology in education, its benefits are not limited to achieving absolute transparency in documents, certificates, and financial transactions, but also to being a key factor in reducing expenses and reducing financial burdens on governments in general.
5- There is no need for an employee in the position of a time monitor, as through the Blockchain, attendance and absence can be monitored without the need for physical presence to count students
6- Providing absolute security for all previously stored files, whether it was a certificate, transaction, or document within the so-called archive. This archive is transmitted to computers and coordinated via blockchain technology and saved from tampering or loss.

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