Research Paper

The Impact of Adopting Blockchain Technologies on enhancing Administrative Transparency: A Survey Study at University of Mosul

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Abstract

This paper intentionally tried to showcase the role of blockchain technology in improving administrative transparency by showing how the current-day modern technology can be utilized to build new administrative systems and fulfill the principles of administrative transparency. In order to meet the objectives of the research, a questionnaire was developed as a major tool of collecting data. There were 50 questions in the questionnaire and the views of 246 people were collected in the most different manner. The study was descriptive and analytical in nature, and it involved a number of statistical and software tools. Frequencies, percentages, means, standard deviations, relative importance, reliability, internal consistency, and normality have been determined with the help of SPSS v26 statistical software. Correlation and impact relationships were examined by using the AMOS v24 statistical software. The findings all came up to the conclusion that the use of blockchain technology in administration systems can play a significant part in ensuring transparency in the university through the introduction of a solid and secure online database, better and more precise information, and greater accountability of various administrative tiers. The paper suggests the implementation of a full-scale digital strategy at the University of Mosul that should involve the implementation of blockchain technology. It includes blockchain technology in its administrative system to guarantee better performance of the institutions and smart management of the universities through integrity and transparency.

Keywords:
Blockchain technology, administrative transparency, administrative

ورقة بحثية
تأثير تبني تقنيات سلاسل الكتل في تعزيز الشفافية الإدارية: دراسة استطلاعية في جامعة الموصل

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المستخلص

يهدف البحث إلى بيان دور سلاسل الكتل (البلوك تشين) في تعزيز الشفافية الإدارية عبر توضيح كيفية توظيف هذه التقنية الحديثة في تطوير النظم الإدارية وتحقيق مبادئ الشفافية الإدارية، ولتحقيق أهداف البحث صممت استمارة استبانة لتكون أداةً رئيسة في جمع البيانات، التي تم تغطيتها عبر (50) سؤالاً تظهرها الاستبانة، واستقصت الآراء بشكل جديد تماما (246) من الأفراد ، وأعتمد البحث المنهج الوصفي والتحليلي، و استخدمت عددا من الاساليب الإحصائية والبرمجية باعتماد البرنامج الاحصائي (Spss V.26) للاستدلال على التكرارات والنسب المئوية والأوساط الحسابية والانحرافات المعيارية والاهمية النسبية وقياس الثبات والاتساق الداخلي واختبار التوزيع الطبيعي، كما استخدام البرنامج الاحصائي (AMOS V24) لتحليل علاقة الارتباط والتأثير، وتوصلت النتائج إلى أن اعتماد سلاسل الكتل في الأنظمة الإدارية يمكن أن يسهم بصورة ملموسة في تحقيق الشفافية داخل الجامعة بتوفير قاعدة بيانات رقمية موثوقة وآمنة، وتحسين دقة المعلومات، وتعزيز المساءلة بين المستويات الإدارية المختلفة، وأوصت الدراسة بضرورة تبنّي استراتيجية رقمية شاملة في جامعة الموصل تتضمن إدخال تقنية سلاسل الكتل ضمن منظومتها الإدارية، بما يضمن تطوير الأداء المؤسسي وتحقيق الإدارة الجامعية الذكية القائمة على النزاهة والشفافية.

Introduction

The contemporary world is witnessing rapid digital transformations that have profoundly changed the nature of administrative work and decision-making methods within public and private institutions. The use of modern technologies has become a critical factor in ensuring efficiency and good governance, and improving integrity in workplaces. Among the modern technologies, the blockchain technology has been identified as one of the most significant developments in the sphere of managing information and processing transactions electronically because it is characterized by its capacity to attain transparency, trust and security in information exchange without requiring the central agent. It is worth mentioning that blockchains have more than a simple use case of recording the transfer of value between two parties; The core benefits of cryptographic identity, historical and sequential source and full logging of the network logs are optimal in many fields where mutual trust is required (El Madhoun, 2025). Conversely, transparency is a key element of governance in administrative transparency and a principle for creating an environment where information is available about current conditions, decisions, procedures, and how information is provided. It also facilitates policy decisions related to a more specific community through timely publication and openness to all stakeholders. Furthermore, it fosters an attractive work environment that facilitates predicting changes and thus determining future directions. Academic institutions are essential for building well-rounded individuals and are a tool for society to achieve progress and development. Therefore, it is important to connect the university with society by linking centers of learning with centers of production.(J. Al Shobaki, 2017).

On the basis of the above, the present study has four sections. The former covers the methodology of the research starting with the research problem, objectives and importance of research, and outlines its hypotheses. The second encompasses the blockchain technologies and administrative transparency. Third comprises the practical framework that deals in descriptive statistics of the dimensions of the research and testing of the hypotheses. The concluding and recommendations are given in the fourth.

1. Research Methodology
1.1. The Research Problem

One of the cornerstones in the development of effective administrative systems that help reduction of corruption and efficiency of institutional performance is administrative transparency. Nevertheless, education institutions, such as the University of Mosul, have a lot of problems with making high rates of transparency, particularly, in the cases when the secure digital systems which guarantee information accuracy and good flow are not provided. With the current technological progress, blockchain technology has become an innovation in which decentralization, resistance to tampering of data, and their high-preciseness in tracing administrative and financial processes are some of the key features. Thus, the research problem is stated in the following question: How much will implementing blockchain technologies increase the administrative transparency at the University of Mosul? This primary question will be further lengthy and dividing into a number of sub-questions, such as:

1. What is the amount of awareness and knowledge of University of Mosul instructors in respect to blockchain technologies?
2. What is the level at which the university is ready to embrace the adoption of these technologies in its administrative processes?
3. How does the implementation of blockchain affect the reduction of administrative corruption and improvement in the faith towards the administrative system?

1.2. The Importance of the Research

1. Theoretical Importance of the Research: The theoretical significance of the research is conditioned by the intention to add a relatively new issue to the administrative literature in the environment of the Iraqi university blockchain technology, and administrative transparency. The study also helps to create a body of knowledge connecting the idea of modern technologies to the functioning of the public administration, which can lead to further research on the subject of the digital transformation of educational establishments.

2. Field Importance of the Research: The field significance of the research is also influenced by the fact that the findings of the research can be applied in the environment of the University of Mosul, which will assist in creating more transparent and efficient management systems. Moreover, the research results may serve decision-makers at the Iraqi universities as the means of utilizing blockchain technologies as the solution to the problem of administrative transparency and increased trust in administrative and financial processes, as well as the improvement of services delivered to students and instructors.

1.3. Research Objectives

The objectives of the current research are several in number with the following being the most important:

1. To determine the notion and significance of blockchain technologies and its implementation in creating new administrative systems.
2. To find out how much the instructors at the University of Mosul are aware of the significance of using these technologies in the university working environment.
3. To analyze the impact of adopting blockchain technologies on enhancing administrative transparency and reducing opportunities for administrative corruption.
4. To propose practical mechanisms for implementing blockchain technology at the university in a manner that aligns with its technical and human resources.
5. To contribute to building a modern administrative model based on transparency and accountability in Iraqi higher education institutions.

1.4. Research Hypotheses

1. **H1**: There is no statistically significant correlation between blockchain technology and administrative transparency at a statistical significance level ($\alpha \leq 0.05$) from the perspective of a sample of instructors at the University of Mosul.

a. **H1-1**: There is no a statistically significant correlation between blockchain technology and each dimension of administrative transparency at a statistical significance level ($\alpha \leq 0.05$) from the perspective of a sample of instructors at the University of Mosul.

2. **H2**: There are no statistically significant effects of blockchain technology on administrative transparency at a statistical significance level ($\alpha \leq 0.05$) from the perspective of a sample of instructors at the University of Mosul.

a. **H2-1**: There are no statistically significant effects of blockchain technology on each dimension of administrative transparency at a statistical significance level ($\alpha \leq 0.05$) from the perspective of a sample of instructors at the University of Mosul.

5. Research Model

Figuer 1 shows the proposed research model
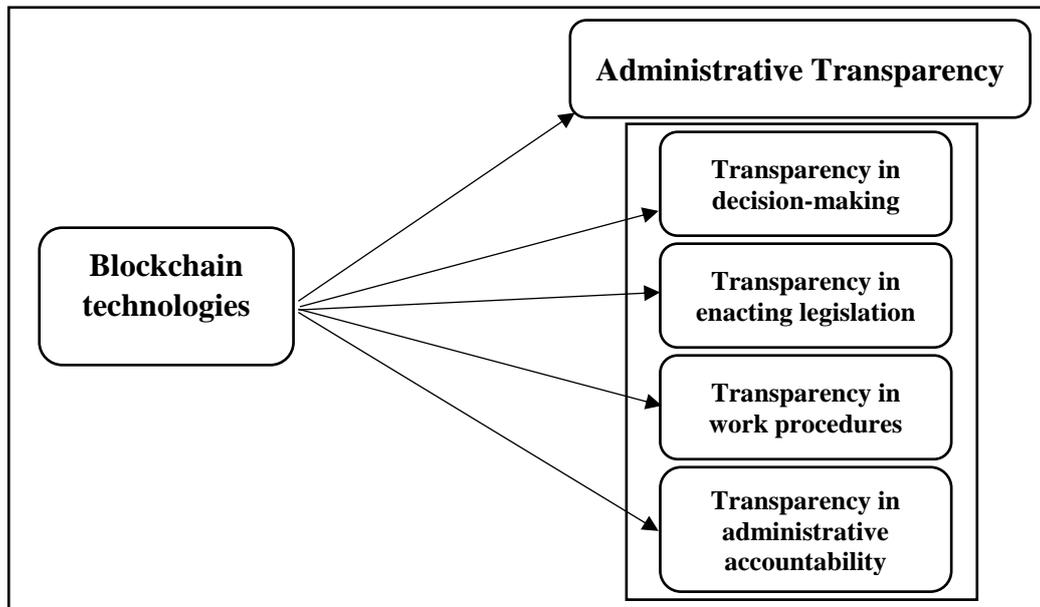
Figure (1). proposed research model

6. Research Scope

1. Time Scope: The research period extends from August 20, 2025, to November 20, 2025.
2. Spatial Scope: The research is confined to certain colleges within the University of Mosul.

7. Sample of study:

The research sample (242) consists of teaching staff in a number of scientific colleges at the University of Mosul (Engineering, Medicine, Computer Science, Mathematics, Management and Economics).

8. Data collection Methods

The researchers relied on available sources from relevant Arabic and foreign studies in specialized literature. They also utilized the internet to cover the theoretical framework. To conduct the field study, a questionnaire will be developed based on a five-point Likert scale to determine the research variables, with a hypothetical mean of (3) in this case of this research. The previous researchers work was also included and some changes, deletions and additions were made to fit the research objectives of the day.

2. Theoretical Framework
2.1. Definition of Blockchain Technology

Unprecedented technological advancement is changing operational mechanisms in organizations across various industries, creating numerous opportunities for improvement and innovation. Blockchain technology is one manifestation of this technological progress; it has been utilized in many fields, including finance and business(Hussein et al. 2023). It is extremely difficult to find a universally accepted definition of the blockchain concept, although researchers have indeed emphasized in their works that blockchain is crucial, resulting from the remarkable evolution in information technology, enabling tasks and transactions to be completed at maximum speed and minimal cost. Multiple definitions of this technology exist, including those provided by (Kumar et al., 2025) and (Al-Shater, 2019), describing it as a database that employs encryption mechanisms to create a decentralized, distributed electronic ledger that is historically linked in a hierarchical manner, resistant to modification or manipulation. It is characterized by transparency, speed, and ease of conducting operations, and it allows relevant parties to participate in its construction, verify its integrity, and maintain it according to self-operating regulatory frameworks. Furthermore, (Sizan et al, 2026) states that blockchain technology is a digital record of internet transactions that logs records in blocks sequentially linked in a single list referred to as the chain. This interconnection and arrangement among the blocks make it difficult to alter or modify transactions because all associated transactions are affected by their links within the same chain, which distinguishes blockchain technology as decentralized.

On the other hand, (Abdul Karim, 2022) posits that blockchain technology represents chains of trust, as it addresses the issue of trust deficits when conducting transactions with no need intermediary. This technology serves as a trusted intermediary authorized by a governing system that regulates relationships, while institutions under blockchain technology are characterized by neutrality and transparency. Meanwhile, (Al-Jukhla, 2021) defines it as a technology enabling the stability and integrity of recorded operational data, stored across multiple distributed nodes connected in a peer-to-peer network. From a technical perspective, (Lim et al., 2021) notes that blockchains refer to a distributed ledger consisting of a series of data blocks, each linked using encryption. Each block contains a set of information about the network, structured with a header and body, and includes information used to connect with the previous block and information used for verification. A distributed database or distributed ledger is defined as the complete record of previous and current transactions occurring within

the blockchain, with every node or device in the network possessing a complete copy of the database. As observed by (Doria, 2025), the blockchain consists of a series of individual blocks connected in a chain, where each individual block includes a technical component or transaction-related feature that allows for the storage of some value. Moreover, each block is encrypted with a specific cryptographic signature, leading to the creation of uniqueness and security. Since these blocks are interconnected, they must communicate with each other to determine whether new blocks can be added to the chain, agreeing with all previous blocks. In summary, you can modify the blockchain itself, but not the transactions within each block. Blockchain technology is distinguished by its unique encryption and operates in a decentralized manner.

2.2. Elements of the Blockchain System

Blockchain technology is a complete system comprising five interrelated essential elements, without which blockchain cannot exist. These elements are as follows: (Abdul Mabdi, 2023), (Ahmed, 2024), (Al-Baidani, 2024), and (Kolb et al. 2025).

1. **Block**: A block refers to the container that holds the data or information stored within the blockchain. Each chain consists of several blocks that include a category of similar transactions occurring within the chain, which are linked together by a unified digital signature ensuring the integrity of the transaction recorded at the moment it occurs. This transaction or process closes in an encrypted manner to form a single block within the consecutive set of blocks within the chain. This block contains information about the transaction to be carried out, along with the relevant codes and encrypted symbols. Typically, a block can only accommodate a limited number of transactions; once a transaction is executed successfully, the block closes, and a new block is created.

2. **Transaction or Information**: This refers to the individual operation or single order intended to be executed within a single block. The transaction is a fundamental element of the blockchain. It may represent an exchange of something of value, such as money, or it may represent a more complex item, such as software programs. The party wishing to conduct this transaction digitally signs it, and upon being received by the network, it is timestamped.

3. **Hash – Encryption**: The hash acts as the DNA of each block and is also referred to as the digital signature. It is a small, encrypted part of the data added to an electronic message, such as an email. Furthermore, the digital signature is a verification technique that includes measures to prevent denial by either the sender or the receiver. It is produced using an algorithm within blockchains known as the hash function.

4. **Network**: The network comprises whole nodes; it works as a computer running a program to make the network secure, with each node containing a complete record of all transactions recorded in that chain.

5. **Timestamp**: This refers to the digital date ("horodatage électronique") of any block creation or data operation performed by any user in the blockchain network, determining the exact moment of execution within the block. This is performed through the generation of a special digital fingerprint, which is an encrypted

collection of letters and numbers that construct a code or what is referred to as a hash which identifies a data creation operation as unique when compared to others. This element is linked to one of the most important functions of the blockchain, which is the storage function, in addition to its role as a digital verifier ensuring the integrity of the transactions carried out. To clarify, we can say that the blockchain consists of four main elements: the block, the information, the hash, and the timestamp, as illustrated in Figure 2.
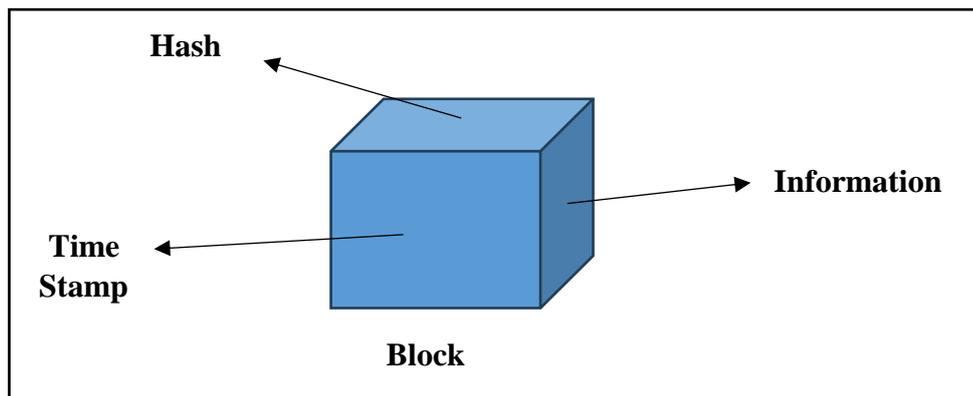

Figure (2). Blockchain System Elements

Al-Salahat, Sami Muhammad (2021), Waqf and Blockchain Technology, A Sharia Perspective on Investment and Finance, Journal of the College of Sharia and Islamic Studies, Volume 41, Issue 1, p. 134.

2.3. Administrative Transparency

There have been various definitions for transparency. According to Kalokora & Lekule (2019), a transparent institution is one that informs its stakeholders about its internal practices. In this context, transparency is understood as the necessity to inform the general public and provide information about the organization's status, responsibilities, strategies, activities, financial management, operations, and performance. Furthermore, this concept indicates that the transparent organization is responsible for disclosing information to the public as necessary. A company's transparency is reflected in its accountability and, as a concept, exists within a legal framework that governs institutional reporting. It has also defined as complete clarity in planning, policy formulation, decision-making, and subjecting administrative practices to continuous monitoring, along with easy access to information (Handayani,2025) (Serhan,2019).

Furthermore, Patrizia & Massimo (2011) state that administrative transparency encompasses several dimensions: information management, accountability , participation, and administration and communication. The clarity of information and involvement in decision-making contributes to instructors' sense of belonging to the organization as decision-makers and makes them feel that their opinions are important in providing the information they need.

Additionally, Chauke (2023) views the concept of administrative transparency as representing the openness of institutions to public scrutiny, whether through formal

structures such as freedom of information laws or the availability of documents and open meetings. The implementation of transparency has started alongside good governance, accountability to stakeholders, and openness to public oversight.

2.4. Dimensions of Administrative Transparency

The practices of administrative transparency inside an organization create a suitable climate for making correct decisions and formulating policies. Management relies on four primary dimensions, as follows: (Ali et al, 2019)

1. **Transparency in Decision-Making**: This will imply the participation of all the instructors in the organization in the decision making process with consideration to the internal environment of the organization, values, attitudes and the laws which govern the organization as well as flexibility and absence of exaggeration.

2. **Transparency in Administrative Accountability**: This represents one of the innovative mechanisms and methods for addressing many issues faced by government agencies, most notably the administrative corruption in public service, including biases, favouritism, abuse of influence and other forms that have impaired development and administrative reform process in most countries.

3. **Transparency in Administrative Procedures and Instructions**: Transparency is associated with working processes and mechanisms, which are based on explicit and transparent processes that are not time-consuming. This incorporates specific and explicit organizational requirements that comprises laws, regulations and instructions of work and instructors so that they can make use of them when required and as well as understanding of responsibilities and rights of the entity they are employed in.

4. **Work Procedures**: This refers to the detailed steps of work processes or the stages a transaction undergoes from start to finish in a series of written operations involving several people within a specific department or multiple departments. It is designed to ensure that recurring operations are processed in a standardized manner.

3. Results and Discussion
3.1. Hypothesis Test results

The application of correlation coefficient is to establish the direction, strength and nature of relationship between two variables. The value of correlation coefficient (direct or inverse) depicts the direction the relationship is taking. The nearness of the relationship is signaled by the fact that the value of the correlation coefficient is either near +1 or -1; the higher the value is to +1 the more empirical relationship exists between the two variables. And lastly, the value of p of the correlation coefficient indicates the nature of the relationship (whether it is significant or not). The research indicates that the p-value of below 0.05 will imply that the two variables have a strong correlation.

H1:There is no statistically significant correlation between Blockchain technology and administrative transparency at a significance level of (α ≤ 0.05) from the perspective of a sample of instructors at the University of Mosul.

According to the Table (1) and Figure (3) results, it can be concluded that the relationship between the Blockchain technology and the administrative transparency is strong, judging by the value of the correlation coefficient (0.92). This relationship is important based on the p-value that equals (0.004) that is not below (0.05). The same outcome is justified by similar signs of the lower and the upper limits of the 95% Confidence Interval of the correlation coefficient at the level of significance (0.05).This brings to reject the null hypothesis and accept the alternative hypothesis that is that the Blockchain technology and the administrative transparency are correlated and the correlation is statistically significant at the level of significance (α ≤ 0.05).

Table (1). The Relationship Between Blockchain Technology and Administrative Transparency

First variable	relationship direction	The second variable	Correlation value	95% Confidence Interval		P-value
				Lower	Upper	
Blockchain technology	<-->	Administrative transparency	0.92	0.891	0.956	0.004
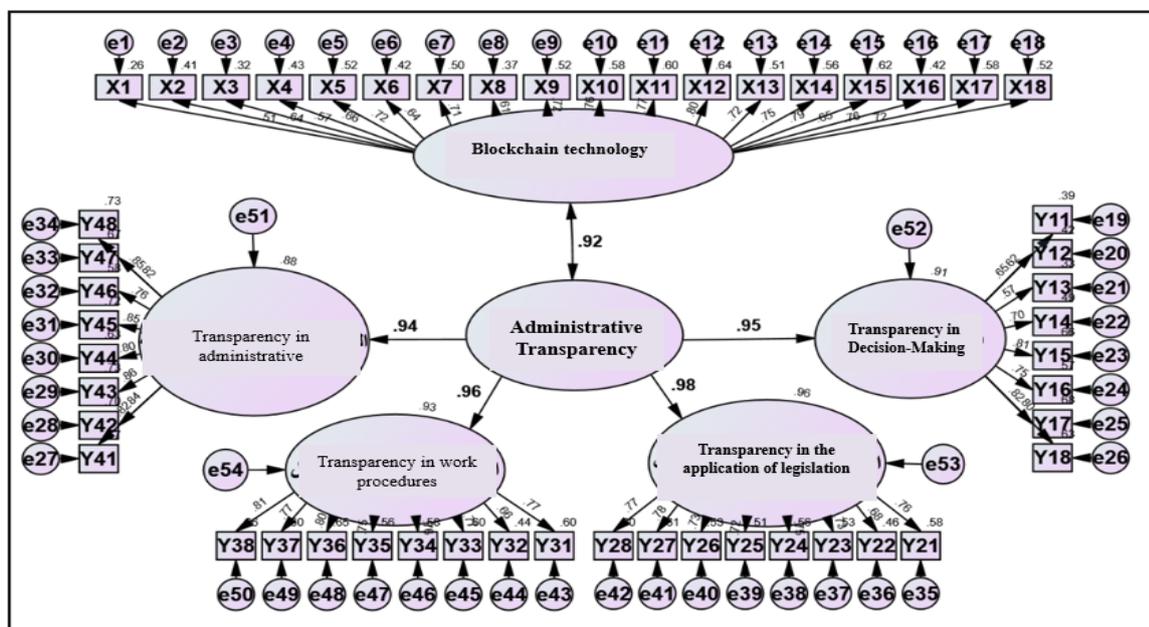
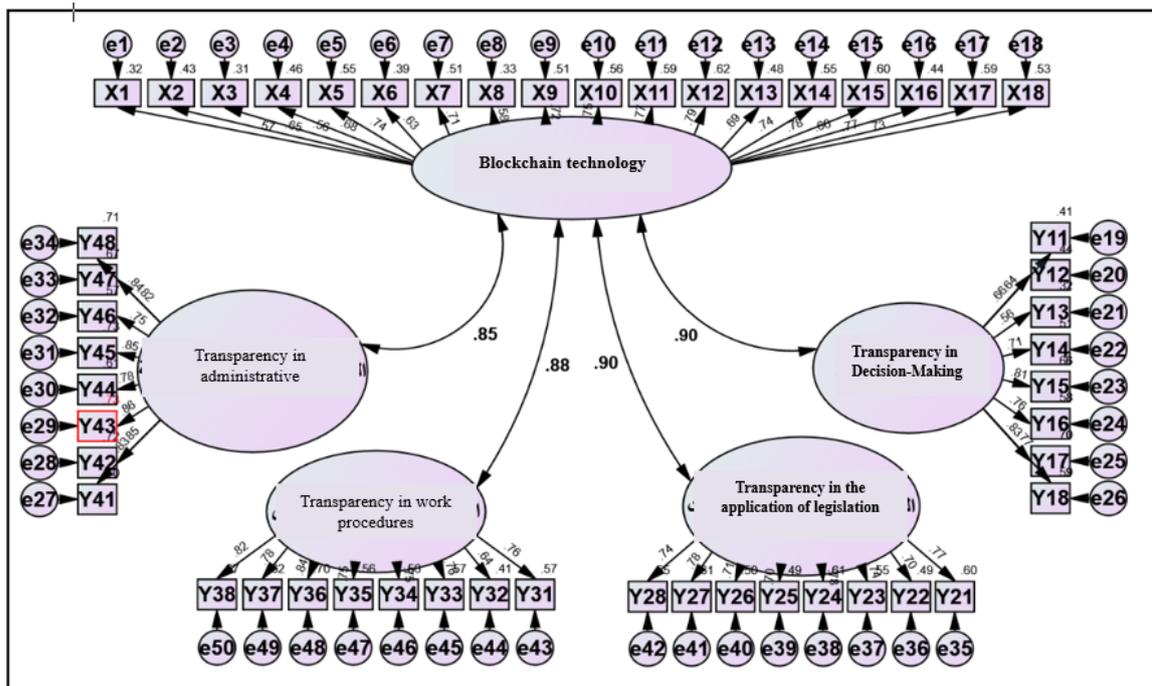**Figure (3).** The relationship between blockchain technology and administrative transparency

H3-1: There is no statistically significant correlation between Blockchain technology and each dimension of administrative transparency at a significance level of (α ≤ 0.05) from the perspective of a sample of instructors at the University of Mosul.

The results from Table (2) and Figure (4) indicate the following:

1. Transparency in Decision-Making: The correlation between the Blockchain technology and decision-making transparency has a very positive correlation with a value of correlation coefficient of (0.90). The relationship between the two variables is statistically significant because the p-value = (0.013), which is lower than p-value = (0.05). The same is also indicated by the results of the lower and upper limits of the 95% Confidence Interval at the level of significance of (0.05). This results in the rejection and acceptance of the null hypothesis and alternative hypothesis respectively which is that there is a correlation between Blockchain technology and decision-making transparency and this correlation is positively significant at the level of significance of.($\alpha \leq$ 0.05).

2. Transparency in the Application of Legislations: Blockchain technology and the transparency in the implementation of legislations have strong positive association with the correlation coefficient of the two variables (0.90). The relationship is statistically significant with p-value of (0.016) accompanying it, which is less than (0.05). This similarity of the signs of the lower and upper limits of the Confidence Interval is confirmed by the same result. This can be stated as the null hypothesis is rejected and the alternative hypothesis is accepted, which is to show that there is a positively significant relationship between Blockchain technology and transparency in the implementation of legislations of significance level of ($\alpha \leq 0.05$).

3. Transparency in Work Procedures: The Blockchain technology and transparency in work procedures are strongly positively correlated with a correlation coefficient value of (0.88). The relationship between the two is statistically significant with the p-value that is accompanying lesser than (0.05) p-value of (0.007). The results also show similar signs for both the lower and upper bounds of the Confidence Interval at the significance level of (0.05). This causes a rejection of the null hypothesis and a test of the alternative hypothesis whereby it is confirmed that there is a positive correlation between Blockchain technology and transparency in work procedures which is positively significant at the significance level of ($\alpha \leq 0.05$).

4. Transparency in Administrative Accountability: Blockchain technology and transparency in administrative accountability have a positive correlation that is significant as the correlation coefficient value is (0.85). The statistical significance of this relationship is statistically significant based on the p-value that is given as (0.008), which is below (0.05). Also, there is the resemblance with lower and upper limits of the Confidence Interval at the significance level of (0.05). This causes the null hypothesis to be rejected and the alternative hypothesis accepted and that Blockchain technology is positively significantly correlated with transparency in administrative accountability ($\alpha \leq 0.05$).

Table (2), Relationship between Blockchain Technology and Dimensions of Administrative Transparency

First variable	relationship direction	The second variable	Correlation value	95% Confidence Interval		P-value
				Lower	Upper	
Blockchain technology	<-->	Transparency in decision-making	0.90	0.839	0.943	0.013
	<-->	Transparency in the application of legislation	0.90	0.853	0.941	0.016
	<-->	Transparency in work procedures	0.88	0.805	0.908	0.007
	<-->	Transparency in administrative accountability	0.85	0.836	0.927	0.008

Figure (4). The relationship between blockchain technology and dimensions of administrative transparency

In following section , the impact relationship of the independent variable, represented by Blockchain technology, on the dependent variable, represented by administrative transparency at an overall level and through its dimensions, will be tested as follows:

H2: There is no statistically significant impact of Blockchain technology on administrative transparency at a significance level of ($\alpha \leq 0.05$) from the perspective of a sample of instructors at the University of Mosul.

Table (3) and Figure (5) indicate the following:

1. There is a positive impact of Blockchain technology on administrative transparency, evidenced by the regression coefficient estimate (β)(\beta)(β) of (1.32). This impact is statistically significant, as indicated by the p-value of (0.000), which is less than (0.05). The same result also shows the critical value (C.R.) of (6.946), which is greater than the tabulated value (t_{Tab}) of (1.96). This leads to the rejection of the null hypothesis and acceptance of the alternative hypothesis, which states that there is an impact of Blockchain technology on administrative transparency, and this impact is positively significant at the significance level of ($\alpha \leq 0.05$).
2. The value of the coefficient of determination (R-Square) shows that (85%) of the changes occurring in administrative transparency are attributable to Blockchain technology, while the remaining (15%) is due to variables not included in the regression model. In other words, Blockchain technology explains approximately (85%) of the variance observed in administrative transparency.

Table (3). Results of the effect of blockchain technology on administrative transparency

independent variable	Direction of influence	dependent variable	Regression coefficient Estimate(β)	Standard error of the regression coefficient Se.(β)	R-square	C.R.	P-value
Blockchain technology	--->	Administrative transparency	1.32	0.190	0.85	6.946	0.000

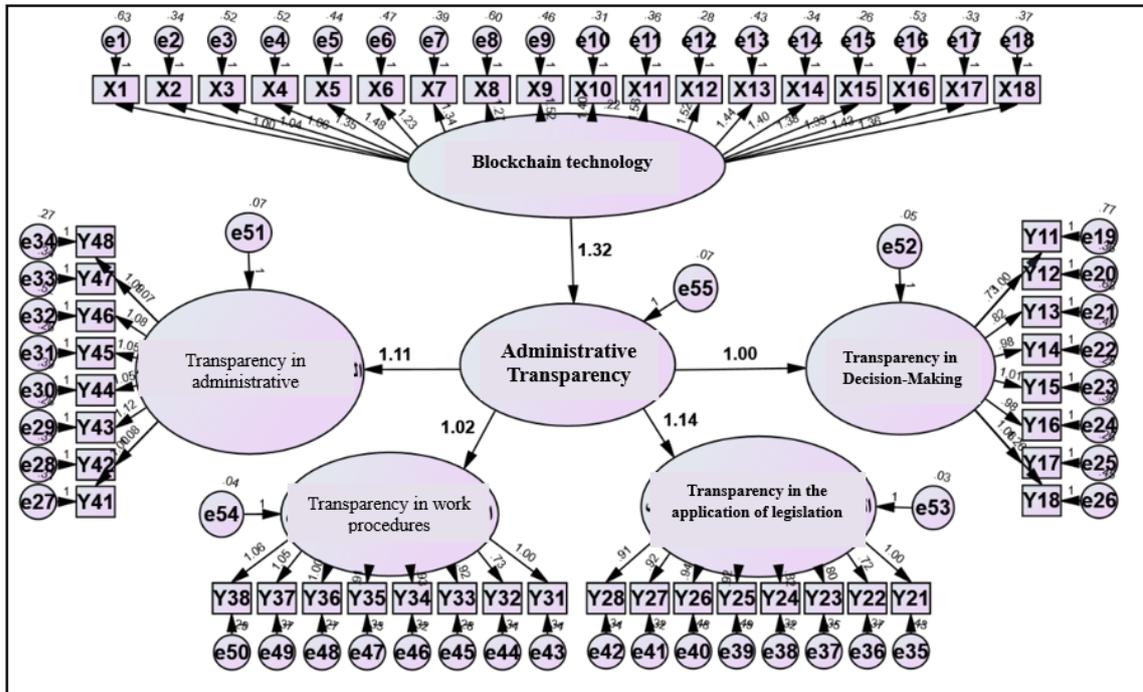**Tabular value** ($t_{Tab} = 1.96$)

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Figure (5). The impact of blockchain technology on administrative transparency

- The first sub-hypothesis, derived from the second main hypothesis: There is no statistically significant impact of Blockchain technology on each dimension of administrative transparency at a significance level of ($\alpha \leq 0.05$) from the perspective of a sample of instructors at the University of Mosul.
- The second sub-hypothesis, derived from the second main hypothesis: The impact of Blockchain technology on each dimension of administrative transparency does not vary at a significance level of ($\alpha \leq 0.05$) from the perspective of a sample of instructors at the University of Mosul.

The results from Table (4) and Figure (6) indicate the following:

1. Impact on Decision-Making Transparency: There is a positive impact of Blockchain technology on decision-making transparency, as evidenced by a regression coefficient estimate (β) of (1.36). This impact is statistically significant with a p-value of (0.000), which is less than (0.05). The critical value (C.R.) is (7.371), which is greater than the tabulated value (t$_{Tab}$) of (1.96). This leads to the rejection of the null hypothesis and acceptance of the alternative hypothesis, stating that there is an impact of Blockchain technology on decision-making transparency, which is statistically significant at the significance level of ($\alpha \leq 0.05$). Additionally, the coefficient of determination indicates that (89%) of the changes in decision-making transparency are attributed to Blockchain technology, while the remaining (11%) is due to variables not included in the regression model.

2. Impact on Transparency in the Application of Legislations: There is a positive impact of Blockchain technology on transparency in the application of legislations, with a regression coefficient estimate (β) of (1.53). This impact is statistically significant, with a p-value of (0.000) which is less than (0.05). The critical value (C.R.) is (8.280), greater than the tabulated value of (1.96). The coefficient of determination indicates that (91%) of the changes in transparency in the application of legislations are attributed to Blockchain technology, while (9%) is due to variables not included in the regression model. This leads to the rejection of the null hypothesis and acceptance of the hypothesis stating that there is an impact of Blockchain technology on transparency in the application of legislations, which is statistically significant at the significance level of (α ≤ 0.05).

3. Impact on Transparency in Work Procedures: There is a positive impact of Blockchain technology on transparency in work procedures, as shown by a regression coefficient estimate (β) of (1.34). This impact is statistically significant with a p-value of (0.000), which is less than (0.05). The critical value (C.R.) is (8.218), greater than the tabulated value of (1.96). The coefficient of determination indicates that (87%) of the changes in transparency in work procedures are due to Blockchain technology, while (13%) is attributed to variables not included in the regression model. This leads to the rejection of the null hypothesis and acceptance of the hypothesis indicating an impact of Blockchain technology on transparency in work procedures, which is statistically significant at the significance level of (α ≤ 0.05).

4. Impact on Transparency in Administrative Accountability: There is a positive impact of Blockchain technology on transparency in administrative accountability, with a regression coefficient estimate (β) of (1.46). This impact is statistically significant based on a p-value of (0.000), which is less than (0.05). The critical value (C.R.) is (8.397), greater than the tabulated value of (1.96). The coefficient of determination indicates that (82%) of the changes in transparency in administrative accountability are due to Blockchain technology, while (18%) is attributed to variables not included in the regression model. This leads to the rejection of the null hypothesis and acceptance of the hypothesis stating that there is an impact of Blockchain technology on transparency in administrative accountability, which is statistically significant at the significance level of (α ≤ 0.05).

5. The coefficient of determination shows that the highest impact of Blockchain technology on dimensions of administrative transparency was in the dimension of transparency in the application of legislations, with a percentage (91%). The second highest impact was on decision-making transparency (89%). The third was on transparency in work procedures (87%)(87%)(87%), and the fourth was on transparency in administrative accountability (82%).

The end conclusion is the rejection of the null hypothesis and acceptance of the alternative hypothesis which is that there is a change in the degree of influence of

Blockchain technology on each dimension of administrative transparency at statistically significant ($\alpha \leq 0.05$) level of view of the sample at the University of Mosul.

Table (4). shows the results of the impact of blockchain technology dimensions on the dimensions of administrative transparency

independent variable	Direction of influence	dependent variable	Regression coefficient Estimate(β)	Standard error of the regression coefficient Se.(β)	R-square	C.R.	P-value
Blockchain technology	--->	Transparency in decision-making	1.36	0.185	0.89	7.371	0.000
	--->	Transparency in the application of legislation	1.53	0.185	0.91	8.280	0.000
	--->	Transparency in work procedures	1.34	0.163	0.87	8.218	0.000
	--->	Transparency in administrative accountability	1.46	0.174	0.82	8.397	0.000

Tabular value ($t_{Tab} = 1.96$)
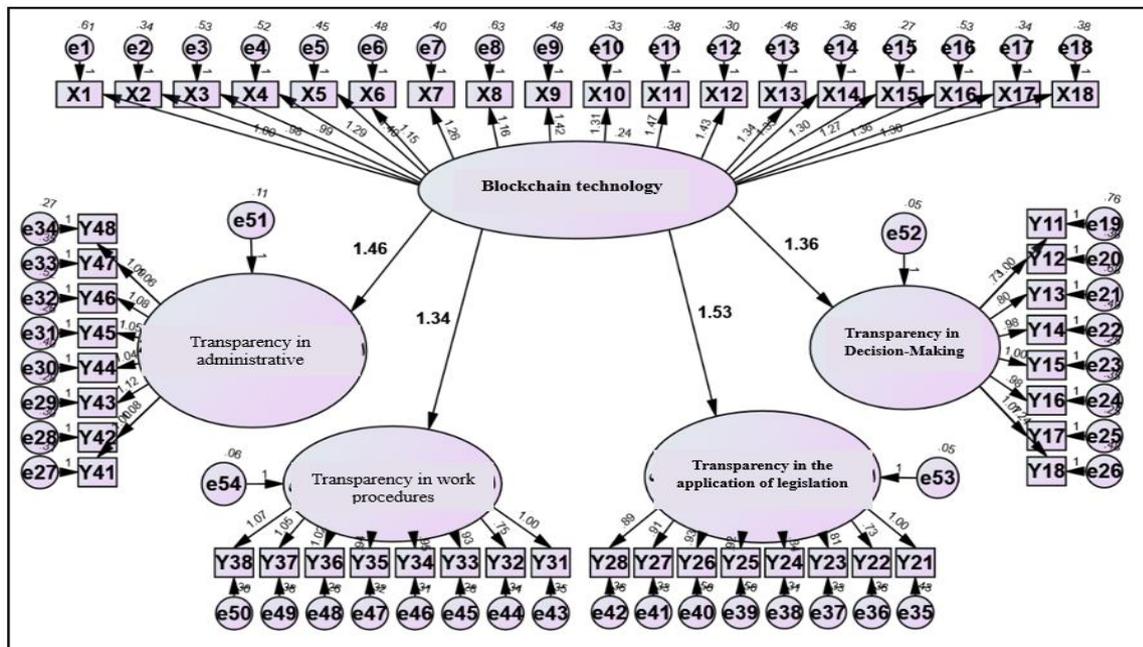
Figure (6). The impact of blockchain technology on the dimensions of administrative transparency

4. Conclusions and Recommendations
4.1. Conclusions

This section presents several conclusions reached by the study based on the theoretical framework and the results of the analytical and applied aspects in the field of Blockchain technology and administrative transparency, as follows:

1. The results indicated that reliance on Blockchain technology at the University of Mosul significantly contributes to enhancing the level of transparency. The technology's ability to provide immutable records supports both "transparency in the application of legislations" and "transparency in decision-making." This was reflected in the high explanatory power of the model, as the technology explained 85% of the variance in the overall level of administrative transparency.

2. The data suggests that a consensus exists among the sample (at a rate of 66.85%) regarding that characteristics of Blockchain, such as identity protection through encryption and rapid reporting, integrate with the dimensions of transparency at the university. This integration is clearly evident in the "dimension of legislation application," which achieved the highest response to impact at a rate of 91%, indicating that the technology ensures the implementation of laws and university regulations with complete clarity.

3. The analytical results demonstrated a significant role and direct impact of Blockchain technology on the level of administrative transparency within the University of Mosul. This impact extended beyond the overall level of transparency to effectively include all of its sub-dimensions. The technology's capability was evident in producing a significant response in decision-making transparency, transparency in the application of legislations, transparency in work procedures, and transparency in administrative accountability. This confirms that the technical characteristics of Blockchain—such as data permanence, decentralization, and traceability—act as a comprehensive technical driver that enhances the efficiency and integrity of the administrative system in the university.

4. The results from Structural Equation Modeling (SEM) illustrated the correlation between the variables of the current study, aligning with the philosophical, sequential, and conceptual interconnections of the theoretical framework based on theoretical data.

5. The results from SEM and the hypothesis tests presented in the study methodology confirmed and supported the theoretical and field relationships between the main and sub-variables of the current study, reflecting the feasibility of adopting its model for testing and measurement in various research fields and different environments.

6. The results of SEM and the hypothesis tests presented in the study methodology revealed a correlation between Blockchain technology and administrative transparency, and this correlation is positive and statistically significant at the significance level ($\alpha \leq 0.05$) at the overall level, as well as at each dimension of administrative transparency (decision-making transparency, transparency in the

application of legislations, transparency in work procedures, and transparency in administrative accountability).

4.2. Recommendations

The researchers suggest a number of recommendations to improve the transparency of administration through the use of blockchain technology, based on the findings and conclusions made in the discussion, which are based on the theoretical and applied conclusions. The blockchain technology is an area of scientific activity that corresponds to the goals of the Ministry of Higher Education and Scientific Research to activate digital work and enhance the transparency of the administration. Moreover, it can be applied in the future research. The recommendations are as follows:

1. We propose conducting research on the effect of "organizational culture" or "artificial intelligence" as a mediating variable between Blockchain technology and administrative transparency. The scope of the study could be expanded to apply this model to other Iraqi universities or different governmental sectors (such as health or municipalities) to compare results and generalize benefits. Additionally, a qualitative study should be conducted to explore the legal and financial challenges that may face the implementation of Blockchain in Iraqi government institutions.

2. It is recommended to invest in the existing infrastructure at the University of Mosul to enhance the adoption of Blockchain technology, while also expanding training programs aimed at beneficiaries. The goal is to enable instructors to understand the technical potentials of this technology and motivate them to apply it in institutional performance, supported by government facilitation and direct technical support to enhance work efficiency in universities. Managers in the studied organization should employ Blockchain technology in decision-making processes to obtain information from various sources in an optimal manner, working towards integrating and harmonizing this information.

3. The top management of the studied organization should establish a strategic partnership approach with its human resources as a priority when formulating future plans. This can be achieved through adopting periodic mechanisms to evaluate employee experiences and ensure alignment between their aspirations and organizational goals. This integration contributes to enhancing service delivery channels and improving compliance with existing regulations and laws.

4. The studied organization must invest in diversifying the skill mix and cumulative experiences of its staff while committing to the sustainable development of the knowledge system for its instructors. This can be realized through advanced training programs focusing on utilizing Blockchain technologies as a tool to enhance procedural transparency, ensuring that human resource skills align with modern technical requirements of the work environment.

5. The rapid advancements in artificial intelligence and digital technologies necessitate adopting a management approach characterized by both vigilance and caution; keeping up with technological modernity is no longer a secondary option but a fundamental pillar to enhance transparency and administrative accountability. From this standpoint, any delay in absorbing these transformations

could negatively impact the organization's competitive ability and hinder its advancement in global university rankings.

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Appendix (1)

Ministry of Higher Education and Scientific Research
University of Mosul
College of Administration and Economics
Department of Management Information Systems

To: Esteemed Participants
Subject: Questionnaire Form
Peace, mercy, and blessings of God be upon you...
This questionnaire form is part of the requirements for preparing the research entitled:
"The Impact of Adopting Blockchain Technologies on Enhancing Administrative Transparency: An Exploratory Study at the University of Mosul"
Given your experience, scientific capabilities, and your ability to handle the questionnaire items, and considering that your participation in providing an accurate picture will positively impact the quality of this research, we kindly request that you select the answer you deem appropriate for each question.
Please note that there is no need to include your name or signature on the form, and the results will be presented as statistical groups unrelated to your identities.
Thank you for your cooperation and wish you continued success. With our highest regards.

General Notes:
- Please answer all questions. Leaving a question unanswered will render the form invalid for analysis.
- Please tick ($\sqrt{}$) the box that represents your viewpoint.
- The researcher is ready to answer all your questions and inquiries regarding the form.

Researchers

Part One: General Information
1. **Gender**: Male ( ) Female ( )
2. **Academic Qualification**: PhD ( ) Master's ( ) Bachelor's ( )
3. **Years of Service**: 1-5 ( ) 6-10 ( ) 11-15 ( ) 16 years or more ( )

Part Two: Study Variable Measures
First - Blockchain Technology: It is a digital system for storing and transmitting data securely, transparently, and immutably. The technology relies on a series of interconnected blocks, where each block contains specific data, a timestamp, and a link to the previous block. Data in blockchain technology is secured using encryption techniques, making it resistant to forgery or alteration.

No	Paragraphs	I strongly agree	I agree	not sure	I disagree	I strongly disagree
1	The public encryption keys adopted by blockchain technology contribute to protecting the identity of users**.**					
2	The public encryption keys adopted by blockchain technology contribute to ensuring the confidentiality of exchanged information.					
3	Reducing the cost of data storage using blockchain technology contributes to improving the efficiency of information management in the long term.					
4	Blockchain technology enhances the speed of administrative reporting.					
5	Blockchain technology enhances the accuracy of management reports.					
6	Blockchain provides a transparent and reliable record of transactions, which facilitates data auditing and increases beneficiary confidence.					

7	The application of blockchain technology at our university contributes to preventing information falsification.					
8	Blockchain technology at our university uses a more secure digital identity, which helps reduce the risk of hacking.					
9	The decentralized nature of blockchain technology helps reduce the likelihood of data being compromised by distributing it across multiple storage points.					
10	Blockchain technology at our university reduces financial costs by providing innovative alternatives that reduce reliance on traditional, high-cost methods.					
11	Blockchain technology enables secure administrative transactions.					
12	Blockchain technology at our university is the ideal choice as it reduces the processes of modification or falsification of administrative data.					
13	Blockchain technology contributes to making it easier for individuals to access administrative services at our university.					
14	Blockchain at our university is an effective tool for registering and protecting intellectual property rights from infringement and forgery.					
15	Transactions conducted via blockchain technology are characterized by maintaining the privacy of stored data.					
16	The ease of transferring encrypted assets via blockchain technology at our university enhances the efficiency of administrative processes.					
17	Blockchain technology at our university is facing resistance from traditional departments due to					

No	Paragraphs					
	potential threats to their business model.					
18	Blockchain technology provides equal opportunities for large and small colleges by reducing the costs of administrative processes.					

Second - Administrative Transparency: Complete clarity in drawing up plans and policies and making decisions, subjecting administrative practices to continuous monitoring and easy access to information.

No	Paragraphs	I strongly agree	I agree	not sure	I disagree	I strongly disagree
First - Transparency in decision-making: Making available the information and processes through which decisions are made, so that stakeholders (such as citizens, instructors, or shareholders) can understand who made the decision, why, in what way, and on what basis.						
19	The managers announce the decisions to all instructors at our university.					
20	Managers consider the impact of their decisions on the overall interest of the university.					
21	The managers explain the content of the new decisions to the instructors of our university.					
22	managers make important decisions in a timely manner.					
23	The decisions of the administrators at are characterized by objectivity.					
24	Managers monitor the effectiveness of their decisions by utilizing feedback from instructors at our university.					
25	At our university, managers base their decisions on scientific principles.					
26	Instructors participate in the decision-making that concerns them at our university.					
Secondly, transparency in the application of legislation: providing information related to how laws are implemented, the decisions resulting from them, and the standards on which the concerned authorities rely, with the aim of achieving justice, accountability, and confidence in the legal or administrative system.						
27	The managers are implementing the new official instructions issued by the Ministry of Education and Scientific Research at our university.					

28	The staff are informed of the official letters issued by the Ministry of Education and Scientific Research at our university.					
29	The administrators are keen to keep up with any new developments in educational legislation, laws, and regulations at our university.					
30	The managers are keen to implement the laws, regulations, and legislation that guarantee the rights of instructors at our university.					
31	The managers clarify any ambiguity in any official legal text for instructors of our university.					
32	Managers at our university consider the capabilities and potential of their instructors when making decisions.					
33	The administrators apply the laws, regulations, and instructions to all instructors at our university without discrimination.					
34	Instructors should consult the Civil Service Guide to learn about their official rights and duties at our university.					

Thirdly, transparency in work procedures: providing information related to how tasks and decisions are carried out within the work environment, clarifying responsibilities, standards, and steps followed.

35	The administrators base their work procedures at our university on legal legislation.					
36	The administrators update their work based on educational developments at our university.					
37	The managers' work procedures are aligned with the educational goals of our university.					
38	The managers are keen to ensure that their work procedures are clear to all instructors at our university.					
39	The managers are keen to implement a transparent monitoring system for all instructors at our university.					

40	The managers adapt their work procedures to suit the educational environment at our university.					
41	Managers avoid duplication in their work procedures to maintain the morale of our university's instructors.					
42	Instructors participate in determining work procedures at our university.					
Fourthly, transparency in administrative accountability: Clarity of the rules and procedures adopted to hold individuals accountable within the public administration or institutions, and enabling those concerned to see the reasons for administrative decisions and their results, in a way that promotes justice, accountability and institutional trust.						
43	The administrators announce administrative accountability procedures for all instructors at our university.					
44	The managers strive to be role models in performance for all instructors at our university.					
45	At our university, managers gradually transition from verbal to written administrative accountability procedures for instructors.					
46	At our university, managers are careful to explain the reasons for administrative accountability to instructors in a tactful manner.					
47	Instructors are given ample time to correct their performance before being held accountable at our university.					
48	Managers at our university are keen to highlight the strengths in employee performance during administrative accountability.					
49	Managers are keen to address weaknesses in employee performance and the stubbornness of administrative accountability at our university.					
50	Managers at our university encourage instructors who improve their performance in various ways.					