*This paper aims to explain the impact of Blockchain Technology as a moderator in the relationship between Big Data and The Risk of Financial Disclosure to address the Risk of Financial Disclosure. Therefore, this technique was used to reduce the risks of disclosing financial and accounting data for various companies. The estimated population size of accounting information systems and information technology professionals is more than 300 in the Egyptian and Iraqi Stock Exchange. The results indicate that all the direct hypotheses that reflect the relation between Big Data characteristics and FDR are supported which is less than 0.05. There is no impact of Volume on Financial Disclosure Risk with a p-value=0.074. the indirect effect of Blockchain Technology on the relationship between (VEL, VER and VOL) and Financial Disclosure Risk was significant with a p-value of 0.048,0.024,0.001 respectively, which is less than 0.05 and does not support the relationship between VAR and Financial Disclosure Risk a p-value of 0.735. Then, we recommend state-of-the-art studies on the use of blockchain for big data applications in different vertical domains such as smart cities, Financial transactions, smart transportation, and smart bank accounts. For a better understanding, some representative blockchain-big data projects are also presented and analysed. Finally, challenges and future directions are discussed to further drive research in the countries of the Middle East. This paper presents the novel solutions associated with Big Data with Financial Disclosure Risks that can be addressed by Blockchain technology. As Well as present the motivations behind the use of blockchain for big data. We show that blockchain has great potential for facilitating big data analytics such as control of dirty data, enhanced security and transparency, enhanced quality of data, the management of data sharing and, Addressing risk financial disclosure*

*Keywords: Blockchain technology, big data, financial disclosure, Iraqi, Egyptian stock exchange*

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# THE EFFECT OF BLOCKCHAIN TECHNOLOGY AS A MODERATOR ON THE RELATIONSHIP BETWEEN BIG DATA AND THE RISK OF FINANCIAL DISCLOSURE (ANALYTICAL STUDY IN THE EGYPTIAN AND IRAQI STOCK EXCHANGE)

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## 1. Introduction

The global data traffic has increased at an unprecedented rate over the last decade, thus the special interest in "big data". As reported by [1], the big data market shall reach 229.4 billion $ in 2025 and significantly reduce the expenditure for various vertical industries like healthcare, retail, transportation and logistics, manufacturing, media and entertainment. Despite the lack of a precise definition, attention to big data can be seen in many scientific and engineering areas, e. g., computer vision, Internet of Things (IoT) data analytics, operation management, and smart cities. Adding to the structural embodiment, [2] considered big data from three aspects, including attributive, comparative, and architectural. According to, big data can be identified as a new generation of technologies and architectures investigated to analyze a large amount of data and capture its main characteristics (e. g., high velocity, knowledge discovery, and analytics). The comparative aspect considers big data as the datasets, which has a very large size and dimensionality and cannot be stored, managed, analyzed, and captured by conventional database tools [3]. From the architectural viewpoint, big data is identified as the datasets, which have very large volume, velocity, and representation, and require significant horizontal scaling methods for efficient processing [4].

Recently, there were unresolved issues related to the previous studies did not address the problem of protecting big data, especially regarding financial and monetary issues regarding piracy and hackers in various international stock exchanges, including the Egyptian and Iraqi ones. So, blockchain as a ledger technology has emerged as attractive solutions for providing security and transparency in big data systems. For example, it was shown in that blockchain can

play a vital role in providing high-quality data and securing data sharing for industrial IoT applications. In [5], a blockchain-based mechanism was proposed for securing data collection in mobile ad hoc networks and incentivizing mobile nodes for efficient data collection. Furthermore, blockchain was also integrated with edge computing servers to enhance the data quality and process the compute-intensive tasks requested by IoT devices with security guarantees [6]. With its unique advantages, blockchain has the great potential to transform current big data systems by providing efficient security features and network management capabilities for enabling newly emerging big data services and applications. In this survey, let's present a comprehensive review of blockchain for big data, ranging from approaches to opportunities and future directions.

However, the lack of data or information on risks facing companies is one of the main weaknesses in the accounting information disclosed by firms. Nowadays, companies are obliged to issue a few items of this kind of information. Thus, the International Accounting Standard Board (IASB, 1995, 1999), under rules IAS No. 32 and 39, and the Financial Accounting Standard Board (FASB, 1998), under rule SFAC No. 133 only establish the compulsory disclosure of market risks arising from the use of financial assets. Likewise, the SEC (1997) through its FFR 8, obliges listed companies to disclose the market risk arising from adverse changes in interest and foreign exchange rates, and in stock and commodity prices. However, the rules do not refer to any other risks affecting firms, such as non-financial risks and financial risks other than market risks. Therefore, if the present model of accounting information were to incorporate a new statement on company risks, this statement would overcome one of the main drawbacks of the present model revealed by external users, mainly investors (present or potential shareholders and lenders).

## 2. Literature review and problem statement

The paper presents the results of research on the impact of Blockchain Technology as a moderator in the relationship between Big Data and Financial Disclosure to address the Risk of Financial Disclosure, Shown, in the introduction to the study, But there were unresolved issues related to the previous studies did not address the problem of protecting big data, especially regarding financial and monetary issues regarding piracy and hackers in various international stock exchanges, In addition, weakness in developing the accounting information system using this technology in Iraqi stock exchanges. Thus, the problem of this study lies in the risks of financial disclosure [7]. The reason for this problem may be the weakness of the traditional techniques used in the protection and confidentiality of data, as well as the reasons related to the weakness of the regulatory authorities, especially in companies operating in developing countries especially Egypt [8]. A way to overcome these problems can be using blockchain technology and its effective role in the technology eliminates barriers to entry as it is based on a trust-building mechanism. There is no need for arduous paperwork to facilitate financial services [9]. The blockchain makes it very difficult for anyone to commit fraud or hide illegal activity. So many people believe blockchain will eventually help create a more transparent and accountable world economy [10]. As well, blockchain data structures harden network security by reducing single-point-of-failure risk, making a database breach difficult. This approach was used by researchers to address the research gap in previous studies. All this suggests that it is advisable to conduct a study on the impact of Blockchain Technology as a moderator in the relationship between environmental costs and financial performance to address the Risk of Financial Disclosure.

So, a blockchain is a list of transactions or a record that is kept up by a network of clients, instead of a focal specialist. It is a sequentially requested series of blocks ensured by illuminating a Proof-of-Work (PoW)/Proof-of stack or any other consensus algorithms. It's known as blockchain in light of the fact that new exchanges are packaged into "blocks" of information and composed onto the finish of a "chain" of existing blocks depicting every earlier exchange. The tying is depleted by joining the hash of the earlier block to the recent block, the hash of the recent block to the subsequently block, and so on. Consecutive nested blocks undertaking transactions to come in a sequential order, thus a transaction cannot be changed antedated without changing its block and all the following blocks. At the same time as the majority of decentralized electronic systems suffer from dual-spending assault, the blockchain makes it impractical except if assailant powers more than 51 percent of the entire system computational power. The scheme makes it computationally hard to generate successive nested blocks (block hashes) to prevent double-spending attack [11].

The first appearance of Blockchain technology was in 2008 through whitepaper for Bitcoin, a digital currency built on principles such as cryptography and decentralization [12]. Recently, blockchain technology has started moving from solely fintech to some other applications. Today blockchain technology has already been identified as a potentially disruptive innovation for the supply chain management. A few innovative companies, such as Walmart and Boeing, have identified the benefits of using blockchain technology in their supply chains, and are exploring their opportunities with the technology [10]. A major hurdle for companies that do not typically follow the behavior of early adopters is to identify disruptive innovations as beneficial to their supply chain management or operations. Therefore, this study takes a pragmatic approach to understand supply chain professionals' perspective regarding their awareness, acceptability, feasibility, and preparedness to take up innovations to optimize the vaccine supply chain and immunization coverage. The principal aim is to determine the possibility of optimizing Nigeria vaccine supply chain with Blockchain and big data analytics.

Blockchain platforms can be classified into three types; public, private and hybrid blockchain, based on their areas of application [13]. A public blockchain does not have any specific single owner and are visible to everyone in the network. Bitcoin is an example of public blockchain which is decentralized with its consensus process being available to all participants in the network. The private blockchain on the contrary is permissioned and controls the participation of network members to read from and write to the blockchain. In hybrid Blockchain, the public access is given to only specific group. It is a partially decentralized framework where the consensus process is guided by rules agreed among all parties regarding the control and access over the blockchain [14].

The Role of Blockchain in Reducing the Risk of Financial Disclosure: Governments and private companies are

investing heavily in big data and blockchain technologies due to their great potential in solving many real-world problems. In modern life, the customers are more inclined to do the transactions online, and expanding amount of data is being generated every day. This exponential rise in the digital data generated creates new opportunities for industries to understand the customer needs, purchasing patterns and trends of the customers. Big data analytics, which uses data mining and statistical models to analyze massive datasets, is playing a major role in helping the industries to gain insights into the purchase patterns of the customers [15]. However, the tremendous growth in the big data presented its own challenges. Some of the key challenges of big data are security and transparency issues, dirty data, reliability of the data sources, sharing of the data, etc. [16].

*Blockchain Protocols*. It's important to remember that there are hundreds of protocols available, so researching the entire list of options would take an inordinate amount of time. However, five major protocols are the most important, so here's a rundown of the most common protocols used in Blockchain development services. These protocols are also widely regarded as the most advanced blockchain platforms available [17].

*Hyperledger*. Hyperledger was released as an open-source enterprise framework. The Linux Foundation is in charge of it. It's a big project with a lot of different frameworks and protocols. Anyone with the necessary expertise can contribute to the project because it is open-source.

*Multichain*. Multichain is a platform that allows users to create private Blockchains that may be used for financial transactions by businesses. Multichain gives us both a simple API and a command-line interface [18]. This aids in the preservation and establishment of the chain.

*Corda*. Corda is a rival to Multichain, which offers an enterprise-focused protocol. The majority of Corda-based applications have been in the financial and banking industries. Corda's technology, on the other hand, may be used in a broad range of unique Blockchain solutions. Corda is a solid choice for Blockchain development solutions in the financial industry because it is accredited by the R3 banking consortium [19].

*Enterprise Ethereum*. Ethereum is one of the most popular public blockchain systems. It has a lot of features, including smart contracts, dApp development, and a lot more. It did, however, need to be permissioned in order to be useful for business.

*Quorum*. Quorum like many other popular protocols, attempts to assist financial institutions. Quorum is noteworthy since it has the financial community's support. J. P. Morgan Chase, for example, is a major financial sponsor of the protocol, and it has garnered additional funding from other major financial institutions [20].

Big data is typically characterized by 4-V features, including volume, velocity, and variety, and veracity [17]. Here, let's briefly describe these features of big data:

1. Volume. Volume simply means the quantity of data, i.e., whether or not a dataset is considered a big data. Regarding big data processing, one usually faces several challenges, which may include the curse of modularity (i. e., not available to store/load the complete data in memory and hard disk), the curse of class imbalance (i. e., there may exist different data distributions), the curse of dimensionality (i. e., the dataset has many features and attributes) [18]. Moreover, data non-linearity, variance and bias, and computing availability are also considered as challenges associated with the volume feature of big data.

2. Variety. Variety represents various types of data such as video, text, and audio, which are generally composed of structured data, semi-structured data, and unstructured data. The major challenges caused by variety may include data locality, data heterogeneity, dirty and noisy data [19]. Here, data locality expresses that the complete data cannot be stored in a data center and is typically distributed over a large number of physical locations. Data heterogeneity is referred to as various heterogeneous sources of data, thus having different data types, formats, models, and semantics. Dirty and noise data means that the data can contain noise and dirty, which would be caused by data collection methods, data sources, and generation time.

3. Velocity. Velocity refers to the generation speed of data, i.e., how fast the data is generated to meet the demand. A massive number of mobile devices will be 13.1 billion in 2023, from 8.8 billion in 2018, which can generate an enormous amount of traffic [20]. Other good examples of the unprecedented growth of data are high-definition videos, video gaming, and streaming platforms (e. g., YouTube and IBM Cloud Video). In some literature, this feature is also considered as variability, that is, different applications may have different rates of data flow [21]. For example, a vehicular crowd sensing system may generate more data in peak hours due to the participation of a large number of vehicles on the road.

4. Veracity. Veracity refers to the quality aspect since the data can be collected from multiple sources, which may include low-quality and noisy samples. It is reasonable since data can be generated by malfunctioning or uncelebrated IoT devices, untrusted devices, and can be transmitted to the data center via fading and dynamic wireless environments [22]. To improve the quality and analytical accuracy of big data, the challenges of data provenance, uncertainty, dirty and noisy data should be effectively tackled.

Financial Disclosure Risks refers to a disclosure commitment is a decision a firm makes about what it will disclose before it knows the content of the information (i. e., ex-ante). The most prominent argument is that a commitment a firm makes to increased levels of disclosure decreases the costs of capital [23]. This literature models accounting information as a noisy signal of cash flows and models the level of disclosure as the precision of the accounting signal. The intuition is that increased levels of disclosures, namely more precise signals, will reduce the uncertainty about terminal cash flows and decrease market risk discounts [24, 25].

Before establishing which risks the company must report, it is necessary first define precisely what it is understand by risk. The current environment in which firms are working, characterized by a high level of uncertainty, does not make it easy to forecast future company behavior [26, 27]. A series of internal and external factors are currently conditioning company wealth and are the causal factors behind the challenges and threats facing firms today. Thus, they are conditioning the company's future net cash flows, and in the final analysis, the firm's equity. In this context, let's identify risk as to the possible loss in company wealth arising from the interaction of these factors [28]. Once it is defined what is understand by risk, three questions must be put forward to analyses how to incorporate information about risks in the current disclosure model:

1) must this information be compulsory for companies or should corporations decide to disclose this kind of information voluntarily;

2) on which types of risk must the company inform;

3) should risk be quantified.

So, according to the classification of risks outlined above, financial risks are those which directly affect company net cash flows. Research on the procedures for quantifying these financial risks has focused on the context of financial entities since this type of risk is the one with the greatest effect on this type of entity. Nonetheless, the so-called financial risks are by no means exclusive to this type of institution, and companies, in general, are to a greater or lesser extent also exposed to them and therefore need models which allow them to be quantified. Market, credit, liquidity, operational and legal risks are all considered financial risks. In this section, let's outline the models which can be used to quantify this type of risk for their subsequent reporting in financial statements. Let's present the models that can be used for the quantification of these risks to report them in the financial statements such as Market risks, Credit risk, Operational Risk, and Liquidity risk [29].

Blockchain Technology, Big Data and the Risk of Financial Disclosure: This study contributes to addressing the risks of financial disclosure by using blockchain technology by protecting big data in industrial companies listed on the Egyptian and Iraqi stock exchanges, so the researcher assumed these hypotheses to reach their confirmation and achieve the goals, By study, the direct hypotheses $H_1$, $H_2$, $H_3$ and $H_4$ with focuses on these new indirect hypotheses:

– $H_5$ Blockchain Technology (BT) as moderator for the relation between Variety and the Risk of Financial Disclosure;

– $H_6$ Blockchain Technology (BT) as moderator for the relation between Velocity and the Risk of Financial Disclosure;

– $H_7$ Blockchain Technology (BT) as moderator for the relation between Veracity and the Risk of Financial Disclosure;

– $H_8$ Blockchain Technology (BT) as moderator for the relation between Volume and the Risk of Financial Disclosure.

Most of the previous studies that the researchers discussed in this study refer to the relationship between Big Data and the technology of the blockchain, and we did not get new development and innovation for this technology. So, the researchers referred to the importance of this study coming from the growing interest in implementing blockchain technology in the corporate environment and the trend towards the adoption of this technology by many global companies across multiple industries. In addition, Egypt and Iraq Stock Exchange accounting departments and global audits have been directed to build projects and programs that contribute to the creation of digital transformation and the application of blockchain technology which contribute to developing financial disclosure to assist users in obtaining sound, secure, and high-quality financial statements.

## 3. The aim and objectives of the study

The aim of the study is to determine The Effect of Blockchain Technology as a Moderator on the Relationship between Big Data and the Risk of Financial Disclosure Is Typical of Companies Operating companies.

To achieve this aims, the following objectives are accomplished:

–to study Proposed Framework to Address Disclosure Risks Big Data;

– to determine the impact of Variety and Velocity on the Risk of Financial Disclosure of the Egyptian and Iraqi Stock Exchange;

– to investigate the impact of Volume and Veracity on the Risk of Financial Disclosure of the Egyptian and Iraqi Stock Exchange;

– to determine Blockchain Technology (BT) as moderator for the relation between features of big data and the Risk of Financial Disclosure.

## 4. Materials and methods

The subject of study includes the impact of Blockchain Technology as a moderator in the relationship between Big Data and The Risk of Financial Disclosure to address the Risk of Financial Disclosure. The main hypothesis of the study is represented by the following sub-hypotheses:

– $H_5$ Blockchain Technology (BT) as moderator for the relationship between Variety and the Risk of Financial Disclosure;

– $H_6$ Blockchain Technology (BT) as moderator for the relation between Velocity and the Risk of Financial Disclosure;

– $H_7$ Blockchain Technology (BT) as moderator for the relationship between Veracity and the Risk of Financial Disclosure;

– $H_8$ Blockchain Technology (BT) as moderator for the relationship between Volume and the Risk of Financial Disclosure.

As well, the simplifications adopted in this study are to directly target employees in the Iraq and Egypt stock exchanges to reach the best approved results in this study. The researchers conducted an electronic survey using an internet-based questionnaire to collect data from different professionals who have good experience about Blockchain technology. The respondents were drawn from different levels of operation, geography, and areas of practice. At the time of this study, the estimated population size of professionals in Accounting information systems and information technology 300 In the Egyptian and Iraqi Stock Exchange. Several professionals whose works are related to Blockchain technology were recruited as the sampling frame in accordance with the method of Easterby-Smith et al. A sample size calculator was used to estimate the expected sample size. At a 95 % confidence interval and P-value of 0.05, the estimated sample size was 290. As well, the manuscript has associated data in a data repository.

The questionnaire was shared on the listserv of the IAPHL and other smaller internet-based social networks (Whatsapp, Gmail, and LinkedIn) and opened for 15 calendar days after which it was closed to further responses. At the end of the one-month time horizon, (December 3, 2020, to February 2, 2021) a total of 250 valid responses were received and the questionnaire closed to further responses using the switch on the Google form. Following this stage, the data were harvested for onward analysis. Let's improve the response rate by assuring confidentiality and providing a concise introduction to the survey and how responses will affect a smoother supply chain. It is also ensured that questionnaires were easy to use and understandable and only took 5–10 minutes of a participant's time. The permission and support of the administrator

of the different platforms were also secured to give the process speed and credibility. The data analysis combined SPSS version 26, Microsoft Excel, and SmartPLS. With SPSS, we better managed data with case selection, file reshaping, and creating derived data. A metadata dictionary was stored with the data. Statistical analysis tasks performed with the base package include the generation of descriptive statistics, prediction of numerical outcomes, and prediction of identifying groups.

Besides, according to [30] proposes a blockchain-based system without any central authority to share and retrieve data. Our proposed system features:

1) data sharing;

2) maintaining the historical data;

3) retrieving and evaluation of data along with enhanced security.

The results of the study showed that the suggested strategy is efficient, practicable, and free of common security attacks and vulnerabilities. In addition, analyses the background of the Blockchain concept, current, and emerging trends in its development, followed by a survey of potential urban applications with particular attention to the governance domain, Blockchain is built based on security with protection of confidentiality, integrity [31]. Moreover, they provided a comprehensive survey on blockchain for big data, Next, they were survey various blockchain services for big data, including blockchain for secure big data acquisition, data storage, data analytics, and data preservation. Finally, challenges and future directions were discussed to further drive research in this promising area [32].

The main contributions of this study discuss the recent advances in blockchain and big data and explain the motivation behind the integration of these two technologies. In addition to addressing the risks of financial disclosure to reach the quality of accounting information. Particularly, the researchers provide an extensive survey on the use of blockchain in a number of key big data services, including big data acquisition, big data storage, big data analytics, and big data transparency preservation. Then, let's explore the opportunities brought by blockchain in addressing the risks of financial disclosure. The emerging blockchain-big data platforms and projects have been also highlighted and analyzed. From the extensive literature review on blockchain-big data services, some key technical challenges are identified and possible future directions to spur further research in the accounting field are pointed out.

To achieve the study's objectives by explain the impact of Blockchain Technology as a moderator in the relationship between environmental costs and financial performance to address the Risk of Financial Disclosure. Therefore, this technique was used to reduce the risks of disclosing financial and accounting data for various partnerships. Fig. 1, which shows the relationship between the variables of the study and the role of blockchain technology as a Moderator variable.

The conceptual framework used for the purpose of this study is based on previous studies and the situation in the problem of study. Fig. 1 gives a diagrammatic summary of a conceptual framework. The following functional model explains relationships among variables in the conceptual framework.

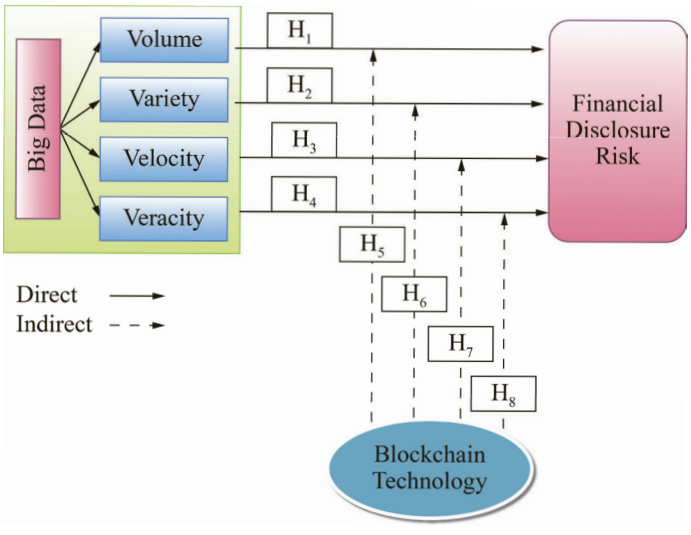


Fig. 1. Conceptual Framework

## 5. Results of the research look at solving the Risk of Financial Disclosure in the Egyptian and Iraqi Stock Exchange

### 5. 1. Proposed framework to address disclosure risks big data

These challenges faced by the big data can be addressed by the unique properties of the blockchain like decentralized storage, immutability, transparency, and consensus mechanisms. The role of blockchain in reducing the risk of financial disclosure in different companies through blockchain technology in Improving Big Data Security and transparency, Improving Data Integrity, Fraud Prevention, Real-Time Data Analytics, Enhancement of Data Sharing, Enhancement of the Quality of Big Data and, Streamlining the Data Access as follows in Fig. 2.

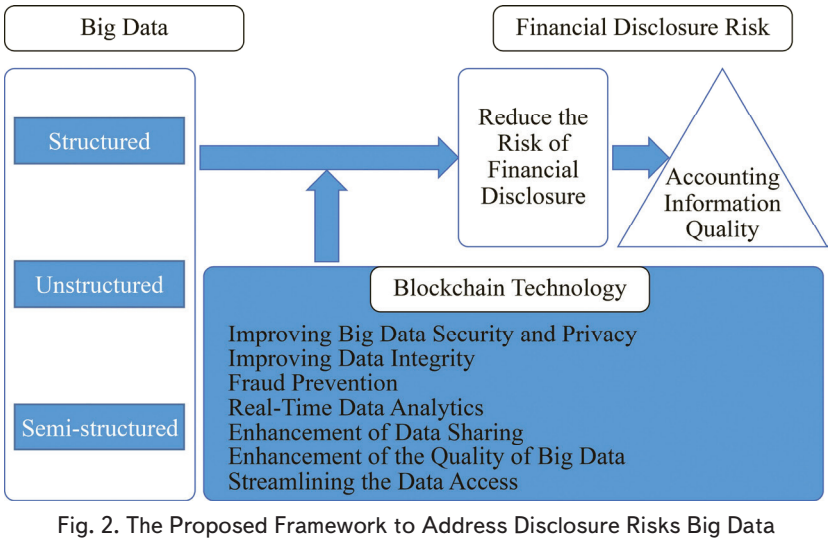


Fig. 2. The Proposed Framework to Address Disclosure Risks Big Data

Fig. 2 indicates that the structure of data categorizes into three main types of big data, which are presented by different

companies in the world, especially the financial data that is disclosed, as it needs protection and complete confidentiality, and to prevent the penetration of this data, the researchers suggested the use of blockchain technology for data protection and coding them, besides increasing the level of disclosure of the various financial data to reach more financial and accounting information, with quality and transparency.

As well, Fig. 2 shows the scientific interpretation of this figure illustrates the role of blockchain technology when it intervenes to protect big data and display it to users in a good way that prevents others from penetrating this data related to financial disclosure and maintaining the quality and transparency of financial and accounting information, and thus contributes to motivating companies to disclose their revenues and various costs to external users, which leads to improve corporates reputation and increase investment opportunities.

### 5. 2. Determining the impact of variety and velocity on the Risk of Financial Disclosure

Text about determine the impact of Variety and Velocity on the Risk of Financial Disclosure. So, the initial measurement model is shown in Fig. 3, where the model shows all the items with their outer loading. Also, the outer loading of the initial items. The factor loadings of all items are checked to delete all items with low factor loadings. According to [33], factor loading should be 0.6 and above.

According to [8] defined CR as an appropriate measure for measuring internal consistency reliability. Moreover, [34] defined it as a set of latent construct indicators shared in their construct measurement. This scale is taken into account for the external loading of the indicator variable. The value of CR is between 0.60–0.70 as in Table 1.

Fig. 3 refers to the study results was obtained using the SmartPLS program, which shows the independent and mediator study variables and also shows the effect of the four independent variables (*Vel*, *Ver*, *Var* and *Vol*) on the dependent variable after supporting the Blockchain technology in a statistically scientific way.

As well, in Table 1 shows the convergent validity is assessed by examining its average variance extracted (AVE) value. According to [30], convergent validity is assessed with individual items that reflect a construct converging in comparison of items measuring with different constructs. In PLS, convergent validity is evaluated by measuring the values of Average Variance Extracted (AVE). The construct's convergent validity is achieved when the average variance extracted is ≥0.50 [35]. Table 1 shows that all constructs have AVE ranging from 0.820 to 0.904, which demonstrates that the measurement model has an adequate convergent validity. The loadings of an indicator on its assigned latent variable should be higher than their loading on all other latent variables. Items should load stronger on their constructs in the model, this can be shown in Table 2.

Table 1

CR and AVE

| Variables | Cronbach's Alpha | rho_A | Composite Reliability | Average Variance Extracted (AVE) |
|---|---|---|---|---|
| Blockchain Technology | 0.988 | 1.013 | 0.989 | 0.901 |
| Financial disclosure risk | 0.972 | 0.977 | 0.976 | 0.820 |
| Variety | 0.981 | 0.985 | 0.984 | 0.857 |
| Velocity | 0.981 | 0.983 | 0.983 | 0.856 |
| Veracity | 0.977 | 0.980 | 0.980 | 0.843 |
| Volume | 0.987 | 0.996 | 0.988 | 0.904 |

Table 2

Cross Loading

| Variables | Blockchain Technology | Financial Disclosure Risk | Variety | Velocity | Veracity | Volume |
|---|---|---|---|---|---|---|
| Blockchain Technology | 0.949 | – | – | – | – | – |
| Financial Disclosure Risk | 0.147 | 0.905 | – | – | – | – |
| Variety | 0.139 | 0.311 | 0.926 | – | – | – |
| Velocity | 0.059 | 0.530 | 0.288 | 0.925 | – | – |
| Veracity | 0.012 | 0.405 | 0.109 | 0.392 | 0.918 | – |
| Volume | 0.035 | 0.357 | 0.214 | 0.368 | 0.221 | 0.951 |

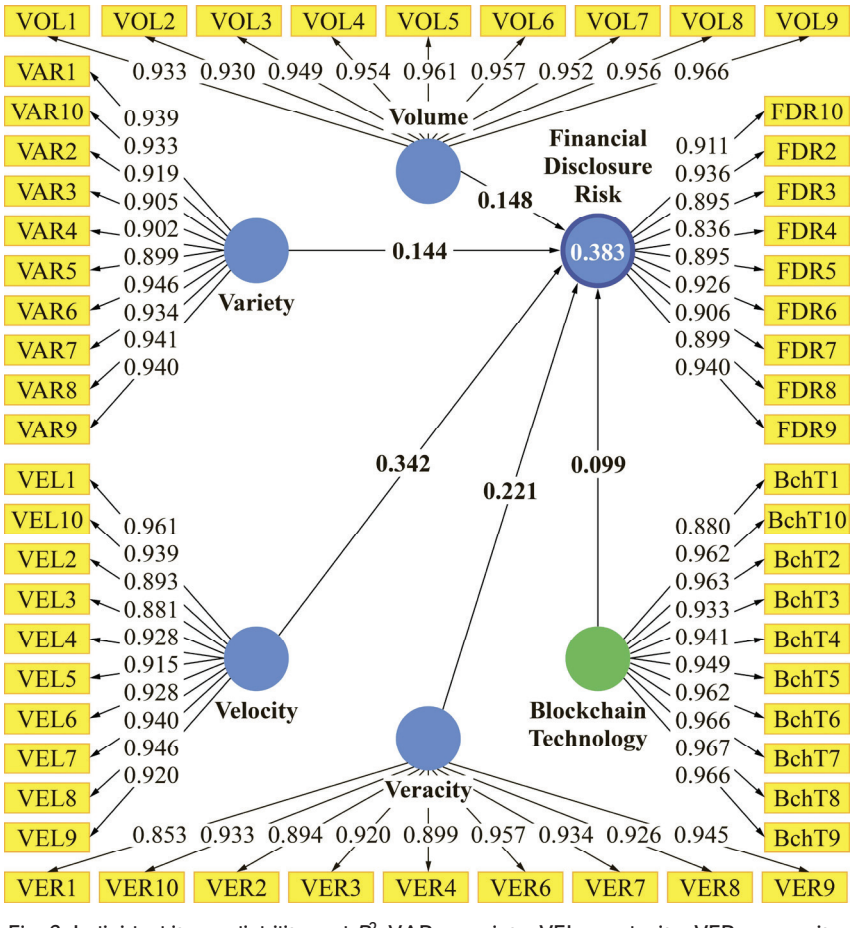


Fig. 3. Individual item reliability and $R^2$: VAR – variety; VEL – velocity; VER – veracity; VOL – volume; BchT – blockchain technology; FDR – financial disclosure risk

The second assessment of discriminant validity examines the indicator's loadings concerning all construct correlations. Cross-loading is done by comparing an indicator's outer loadings on the associated constructs, and it must be greater than all of its loading on the other constructs [36]. Table 2 unveiled that all measurement items loaded are higher against their respective intended variable than other variables. Thus, the second assessment of the measurement model's discriminant validity is confirmed.

**5. 3. Study the impact of Volume and Veracity on the Risk of Financial Disclosure**

Text about Investigate the impact of Volume and Veracity on the Risk of Financial Disclosure. So, the assessment of the structural model involves examining the model's predictive capabilities and relationships between constructs. After running the PLS-SEM algorithm, estimates are obtained for the structural model relationships, representing the constructs' hypothesized relationships. This contains five steps: coefficient of determination denoted by R2, effective size denoted by F2, Q2, GOF, and path coefficient of hypotheses [37].

Coefficient of Determination (R2): In PLS structural model, the combined effect of exogenous variables on endogenous latent variables is evaluated. It represents the amount of variance in the endogenous constructs explained by all exogenous constructs linked to it [38]. A major emphasis in PLS analysis is on the variance establishing the significance of all path estimates. The R2 value ranges from 0 to 1, with the higher levels indicating higher predictive accuracy levels [39]. Similarly, [40] stated that values should be high enough for the model to achieve a minimum explanatory power level. In this study, the SmartPLS algorithm function is used to obtain the values. The results of the structural model with values and path coefficients are depicted, Findings revealed that control Variety, Velocity, Veracity and, Volume could explain 0.383 of Financial Disclosure Risk variance. As, well Path Coefficient of Hypothesis Testing: In path analysis, the correlation among the models should be additive, while the correlation among the model should be causal. The data used should follow an interval type of scale to reduce volatilities in the data which can be shown in Fig. 4.

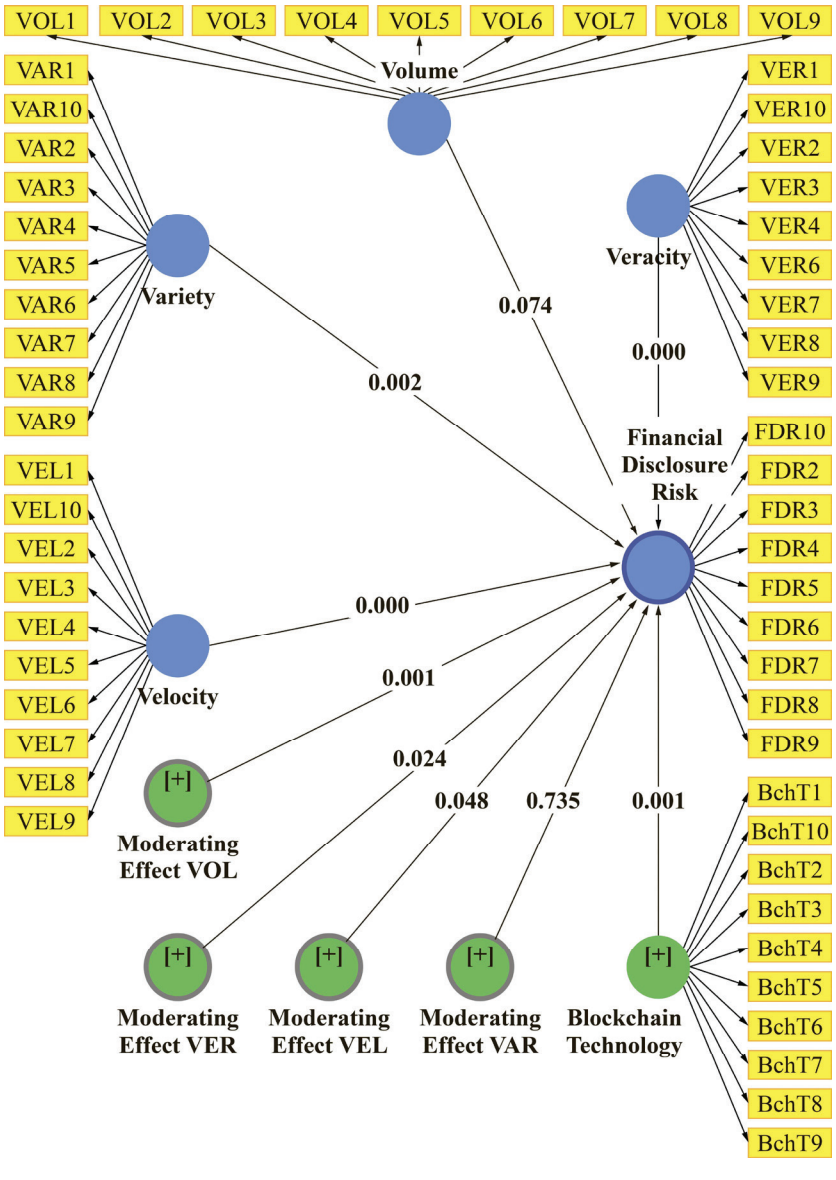


Fig. 4. Model showing Path Coefficient with P-values: VAR – variety; VEL – velocity; VER – veracity; VOL – volume; BchT – blockchain technology; FDR – financial disclosure risk

**5. 4. Determining Blockchain Technology (BT) as moderator for the relation between features of big data and the Risk of Financial Disclosure**

Text about Blockchain Technology (BT) as moderator for the relation between features of big data and the Risk of Financial Disclosure. So, Path analysis theory assumes that all the error terms are not correlated among the various variables and that errors are not correlated among themselves, and only a one-way causal flow exists. Path coefficients are standardized versions of weights that can be used in examining the possible causal link between statistical variables in the SEM approach. Path analysis was developed to decompose correlations into different pieces for interpretation of effects and is closely related to multiple regression. In this case, regression is a special case of path analysis called casual modelling [41]. This name follows the techniques to test theoretical propositions about cause and effect without manipulating variables. The results indicate that all the direct hypotheses that reflect the relation between Big Data characteristics and FDR are supported. Except, there is no impact of Volume on Financial Disclosure Risk, which can be shown in Table 3.

Table 3

Hypothesis-testing Path Coefficients direct and indirect hypothesis

| Hypothesis | Original Sample (O) | Sample Mean (M) | Standard Deviation (STDEV) | T Statistics (\|O/STDEV\|) | P Values | Hypotheses Result |
|---|---|---|---|---|---|---|
| Moderating Effect VAR→Financial Disclosure Risk | –0.017 | –0.014 | 0.051 | 0.338 | 0.735 | Not supported |
| Moderating Effect VEL→Financial Disclosure Risk | –0.110 | –0.111 | 0.055 | 1.985 | 0.048 | Supported |
| Moderating Effect VER→Financial Disclosure Risk | –0.111 | –0.111 | 0.049 | 2.261 | 0.024 | Supported |
| Moderating Effect VOL→Financial Disclosure Risk | 0.156 | 0.155 | 0.048 | 3.233 | 0.001 | Supported |
| Variety→Financial Disclosure Risk | 0.127 | 0.124 | 0.042 | 3.063 | 0.002 | Supported |
| Velocity→Financial Disclosure Risk | 0.414 | 0.417 | 0.059 | 7.070 | 0.000 | Supported |
| Veracity→Financial Disclosure Risk | 0.192 | 0.195 | 0.051 | 3.749 | 0.000 | Supported |
| Volume→Financial Disclosure Risk | 0.098 | 0.098 | 0.055 | 1.788 | 0.074 | Not supported |

Table 3 shows the results of direct hypothesizes. It contains path coefficient and bootstrapping results from direct Effect β, Standard Error, *T*-Values and *P*-Values. Also, the model in Fig. 4 shows the path coefficient for all the direct hypotheses along with their *p*-value. All *p*-values are significant as they are below 0.05.

## 6. Discussion of the results of studying the impact of Blockchain Technology as a Moderator

The testing of the hypothesized relations between the study variables includes testing all the suggested hypotheses, including the direct and the moderating. The alternative significance levels available for researchers in this study used the 0.05 level of significance as the critical level for deciding the acceptability or rejection of the hypotheses. The analysis findings were reported in section fifth and be further discussed in the following sub-sections.

Compared to [10, 30, 41, 42] have indicated the relationship between big data and blockchain technology indicating that this study contributed to addressing the risks of financial disclosure through the use of blockchain technology as an independent variable in protecting big data.

The direct hypotheses comprise all the hypotheses related to the relation of Big Data characteristics (Variety, Velocity, and Veracity) and FDR. The results indicate that all the direct hypotheses that reflect the relation between Big Data characteristics and FDR are supported. Except, there is no impact of Volume on Financial Disclosure Risk, (Table 3). This is consistent with these studies, which proved that there is a great relationship of block chain technology with big data in terms of Security, transparency, Variety, Velocity and Storage [42, 43]. Blockchain Technology moderates the relationship between Big Data and the Risk of Financial Disclosure of companies. This indicates that the significant positive moderate of Blockchain Technology on the relationship between Big Data dimensions and the Risk of Financial Disclosure of Iraqi companies, and so the researcher support to accept the hypothesis.

One determinant of this study is the lack of use of blockchain technology in the financial system in the Middle East despite the use of this technology in this study that blockchain technology is considered being of high risk when used in electronic platforms, especially regarding encrypted money. Today, there are a lot of developers available who can do a lot of different things in every field. But in blockchain technology, there are not so many developers available who have specialized expertise in blockchain technology. Hence, the lack of developers is a hindrance to developing anything on the blockchain.

There are many opportunities for companies to gain an edge over their competitors by using blockchain technology to improve their market position. However, it is important that managers examine the characteristics of their products, services and supply chains to determine whether they need or would sufficiently benefit from the adoption of Blockchain. In addition, it is important that companies build the human capital expertise that will enable them to develop, implement and profitably use applications of this technology.

Thus, the practical novelty of this study by blockchain that plays a major role, Because Blockchain supports any time of digitized information, it's possible to use it in the field of Big Data. And with the great Blockchain — comes great security and quality of data. concerns also grow. It also exposes businesses to potential cyber security breaches.

So, this is where blockchain plays a major role. Because Blockchain supports any time of digitized information, it's possible to use it in the field of Big Data. And with the great Blockchain — comes great security and quality of data.

The restrictions of the study are represented by the reference to Blockchain technologies may expose the blockchain network operator and/or participants in the network to legal and regulatory uncertainty because many governments and regulators are still working to understand blockchain and

whether certain laws should be updated to properly address decentralization.

Further, Big Data presents a number of challenges, As the volume of data grows, major issues for data management and analytics like so-called dirty data, inaccessible data, and Big Data present a number of challenges. As the volume of data grows, major issues for data management and analytics like so-called dirty data, inaccessible data, and privacy concerns also grow. It also exposes businesses to potential cybersecurity breaches.

Therefore, the best of our knowledge, this paper is the first and most comprehensive review of blockchain and financial disclosure risk in the Egyptian and Iraqi stock exchange, covering both industry and academic research into the subject area with over 38 articles and publications being reviewed and summarized for the reader.

## 7. Conclusions

1. The researchers concluded by Proposed Framework to Address Disclosure Risks Big Data that the use of blockchain technology for data protection and coding them, besides increasing the level of disclosure of the various financial data to reach more financial and accounting information, with quality and transparency.

2. This shows that path $H_1$: VAR→FDR has a standardized estimate of 0.383 and $t$-value=0.144 with a p-value of 0.002. As this is less than 0.05, this means $H_4$ is accepted, establishing a direct relationship between VAR and FDR. This shows that path $H_2$: VEL→FDR has a standardized estimate of 0.383 and t-value=0.342 with a $p$-value of 0.000. As this is less than 0.05, this means H4 is accepted, establishing a direct relationship between VEL and FDR.

3. This shows that path $H_3$: VER→FDR has a standardized estimate of 0.383 and $t$-value=0.221 with a p-value of 0.000. As this is less than 0.05, this means $H_4$ is accepted, establishing a direct relationship between VER and FDR. The findings of $H_3$ appeared that $p$-value=0.074 is not significant, and $t$-value=0.148 less than a minimum $t$-value. The results showed there is no significant relationship between Volume and Financial Disclosure Risk.

4. The results indicated that the indirect effect of Blockchain Technology on the relationship between (VEL, VER and VOL) and Financial Disclosure Risk was significant, with a $p$-value of 0.048,0.024,0.001 respectively, which is less than 0.05. So, hypothesis $H_6$, $H_7$, $H_8$ is accepted. That means Blockchain Technology as a moderator has a positive impact and supports the relationship between big data and Financial Disclosure Risk. As well, the impact of Blockchain Technology as a moderator was insignificant, with a $p$-value of 0.735 and does not support the relationship between VAR and Financial Disclosure Risk. So, hypothesis $H_5$ is rejected.

## Conflict of interest

The authors declare that they have no conflict of interest in relation to this research, whether financial, personal, authorship or otherwise, that could affect the research and its results presented in this paper.

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## Data availability

Manuscript has associated data in a data repository.

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