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A New Transparent and Secured Transmission Routing Method for Blockchain Data in Management Systems

Jing Zhou [1, 2], Ong Tze San [2*], Yan Zhu [1]
[1]School of Economics and Management, East China Jiaotong University, Nanchang 330013, China
[2]School of Business and Economics, Universiti Putra Malaysia, 43400 Serdang, Malaysia
Jing Zhou, Email : 3164@ecjtu.edu.cn
ONG TZE SAN, *Email : tzesan@upm.edu.my*
Yan Zhu *Email :* zy15979145215@126.com
[*]Corresponding author: **Jing Zhou**

Abstract
A significant quantity of information, particularly financial data, has now been growing in accordance with the advancement of information technologies. Due to the prevalence of fraud, it is impossible to identify the data sources for corporate financial data and the applicable employees. There are substantial issues with nonstandard behavior and a lack of critical financial data of these firms, as evidenced by the fact that the majority of employees are not capable of perform appropriate queries on the needed financial statements. It has consistently created financial information management for companies more difficult, posed a risk to the entire company's ecosystem, and hurt the interests of several parties, among other concerns, because many analogous concerns were not satisfactorily addressed. Blockchain has garnered a great deal of attention recently, and Crypto currency and other crypto currencies have gained popularity as a result. This is because of the characteristics of blockchain, like centralized control, confidentiality, truthfulness, and lack of courage, which make data difficult to predict and tamper with. According to current implementation and exploration, blockchain has emerged as a novel solution to issues relating to company financial information management since these features are connected to the data storage privacy and data transfer speed required by this type of management. In order to construct a transparent and secured transmission method for blockchain data, the study deployed blockchain for managing the financial management framework and information processing strategy. In terms of security level, throughput, run time, and scalability, the suggested Blockchain solution is contrasted with existing approaches.

Keywords: - Blockchain, Crypto currency, Information Management, cost information management, Financial Data, Security.

I INTRODUCTION

Blockchain technology is a major step forward for the IT industry. Progression in many sectors, including the social and economic, may be possible in the long run if trust can be created and maintained. Writing for a magazine the document "Bitcoin: a peer-to-peer electronic money system" is frequently seen as the origin of the blockchain's popularity. Part of blockchains' utility comes from their status as decentralized ledgers. Using cryptography, time stamps, tree topologies, and consensus mechanisms, this system allows trustless peer-to-peer transactions over a distributed network. In comparison to the present centralized system, blockchain technology offers significant improvements in four key areas: dependability, security, cost, and efficiency. Some people think that spreading the word about renewable energy might be aided by creating distributed energy systems based on blockchain technology. There has been a lot of talk and research on blockchain technology ever since it was first developed. The top leader of China has created conditions that are strategic and operationally advantageous to the growth of blockchain technology and industry. The highest levels of Chinese government are now engaged in intensive study of blockchain technology, positioning China in the vanguard of technological development. The Communist Party of China's Political Bureau has never previously held a nationwide educational conference on technology in China. This is why the Chinese government is pushing so hard to make China the unrivaled leader in the blockchain business worldwide.

For this reason, it is essential to conduct a global survey of scholarly work on blockchain technology. To put it simply, blockchain technology has profoundly transformed the corporate environment. Many see the revolutionary potential of blockchain technology due to the time and resources it may save during transactions and the enhanced transparency that comes with it. Due to its rapid economic, scientific, and technical growth, China is frequently recognized as one of

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the world's fastest-developing countries. China's preeminent position makes its blockchain research noteworthy. Therefore, people will be doing our research in China. It seems to reason that blockchain technology will get more attention in Chinese media outlets in light of the government's apparent interest in the sector. Therefore, understanding China's place in the global blockchain research community is vital if people want to foster the growth of blockchain research and technological innovation. The global adoption of blockchain technology might be sped up by identifying and evaluating regional differences in the underlying research. In addition, the results serve as a helpful reference point for other developing countries pursuing industrialization.

The increasing variety of applications for blockchain technology might have far-reaching effects. There are four key areas where scientists are devoting their efforts right now. The blockchain is having an effect in many different fields, including accounting, auditing, and financial transactions. This was what the study found to be true. Companies may be able to save a significant amount of money on transaction expenses if they are able to negotiate agreements with one another. Blockchain also permits fast international commerce, removing the need for middlemen and the extra expenses associated with changing currency rates. These characteristics are dangerous to the established order in the banking and finance industry [14]. The potential for supply chain applications to "deliver substantial Return on Investment at an early stage of blockchain development" is currently being analyzed [15]. Blockchain's distributed ledger technology enables authentic owner verification and real-time asset tracking. The current technique is cumbersome since each participant is responsible for maintaining his or her own database. It is possible that this will be avoided with a centralized database that is accessible to anyone and can be independently checked [16]. Blockchain technology might be used to keep tabs on interconnected objects like temperature-measuring sensors in vehicles or cold storage facilities, ensuring that goods are kept secure at all times [17].

Blockchain in internal control management

To round out a trinity of interconnected ideas, two-sided markets may be added to the blockchain. It is normal practice for the parties to a transaction to enlist the help of a third party to improve the value produced by the agreement [18]. Due to the decentralized nature of blockchain ledgers, however, a centralized authority is unnecessary. These technical advancements have led to a decentralized system in which middlemen are no longer required to complete financial transactions. While doing so, it eliminates the stressful conditions, the useless activity, and the costly exchanges. In a blockchain system, the function of servers may be taken over by the distributed network of nodes [19]. For instance, the blockchain has the potential to transform the review and publishing sectors while while protecting the jobs of creative professionals.

Finally, people compile a number of research projects that explore blockchain technology's potential benefits for the social welfare sector [20]. As a result of the immutability of the data recorded in a blockchain, "smart contracts" may be put into effect, allowing the parties to a contract to determine its terms in advance and instantly begin carrying them out, thereby eliminating the need for intermediaries [21]. A newcomer to the market may be able to gain the confidence of her peers and start trading on a regular basis if people is able to successfully bridge the knowledge gap that arises during transactions of this kind. Blockchain technology might be used to digitalize voting processes, which would boost openness and reduce opportunities for voter fraud [22]. Blockchain technology also has the potential to streamline the exchange of health information between hospitals and universities. Because of its encryption, decentralization, and consensus procedures, blockchain technology has the ability to resolve modern security issues. An internationally interchangeable format will considerably improve the security and accessibility of private patient data for healthcare providers and organizations [23]. Numerous industries may find uses for blockchain technology that might improve upon current methods of doing business. However, it prevents people from being creative and coming up with new ways of doing business. Customers might be persuaded to adopt blockchain-based business models because to the many advantages they provide. Clients may save money via disintermediation if distributed ledger technology is used to reduce their data storage demands and speed up their transactions [24].

Blockchain technology has the potential to operate independently of a central authority, unlike traditional transaction systems [25]. Blockchains provide this function instead of centralized transaction systems, which were previously necessary for establishing confidence among users. For instance, blockchain technology enables a dispersed and anonymous network of users across geographies to participate in microtransactions. All financial dealings take place in a safe environment. Since the blockchain is decentralized and uses stringent validation procedures, users may feel comfortable utilizing it [26]. Blockchain technology has the potential to improve the efficiency, transparency, and safety of distributed autonomous organizations (DAOs). A decentralized

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autonomous organization (DAO) may run autonomously provided shareholders oversee it and smart contracts govern its day-to-day operations. If businesses do not have to fork up commission to go to intermediaries, they may be able to pass the savings on to their consumers [27].

To what extent a firm function is likely to be influenced by the assets it uses to support blockchain technology. It's possible that a blockchain may one day make it easier to trade not only digital but also physical goods. Blockchain-based asset tracking has the potential to significantly transform the relationships between organizations and their customers, suppliers, and partners [28]. Tokenization and encryption are only two of the numerous benefits your company will experience after switching to a blockchain-based system. Encrypting and verifying all network transactions might significantly alter a business's value proposition. The term "tokenization" is used to describe the process of exchanging a made-up token for sensitive data [29]. To increase the value of the company's idea, it may be sufficient to simply distribute tokens to investors or accept tokens from the general public. The tokens issued by a corporation and maintained in a blockchain ledger might serve as both a kind of currency and proof of ownership. There are many possible applications for blockchain technology, but it also faces many obstacles [30]. Personal information and other sensitive data must be safeguarded, and it must also be easy to use, interoperable with other systems, fast, scalable, and reliable.

II LITERATURE REVIEW

Health information systems are being used in the daily provision of healthcare to patients as a result of the digital economics of health and its globalization. As a result, real-time electronic healthcare services are being provided through the development of web-based electronic healthcare. In this way, all parties involved in the health organization exchange health information through the application of the concept of electronic health, with the common goals of tracking patient health status, prompt intervention, and adequate resource allocation. In order to prevent the exploitation of health data, processing and sharing a significant volume of health data in real time while always requiring a high level of interoperability and scalability of network infrastructure calls for the greatest level of data access security. The risk of abusing health information, information asymmetry, and the risk of rising transaction costs are quickly decreased by implementing blockchain technology. Blockchain is a strong mathematical algorithm that can guarantee the highest level of transaction security utilizing cryptographic techniques. The foundation of this kind of technology is a distributed database with encrypted data that cannot be altered or disturbed. Because of this, the use of this technology as a tool for data integration may be seen more and more in the electronic healthcare and business operations of health organizations. The use of blockchain technology, particularly in information-intensive electronic medical records and applications, ultimately lowers the cost of providing healthcare services, particularly when it comes to interoperability, security, and system maintenance costs. In this paper by Zarko Radjenovic (2020), there will be more to say about the positive economic impact of blockchain technology on electronic healthcare, especially in the case of Estonia, in light of the previously mentioned cost-saving role of blockchain technology in processing, sharing, and analyzing healthcare data [34]. This European nation is a leader in developing, implementing, and utilizing the e-Health concept as a vital component of its healthcare system's health information system in order to improve the effectiveness of healthcare services.

Blockchain is one of the next digital technologies that Industry 4.0 involves advances with. For both small and large businesses, blockchain can be used to enhance security, privacy, and data openness. Industry 4.0 is a synthesis of the modern production techniques that help businesses reach their goals more quickly. Numerous Industry 4.0 technologies, including Artificial Intelligence (AI), the Internet of Things (IoT), Big Data, and Blockchain, have been the subject of research into how they might cause major disruptions in recent years. These technologies open up a wide range of options for the manufacturing and supply chain industries. Blockchain is a technology that has attracted a lot of attention and can improve the environment for manufacturing and supply chains. The benefits of blockchain are now fascinatingly understood in a variety of fields. For this study, a number of research articles on "Blockchain" and "Industry 4.0" were found and reviewed in Google Scholar, Scopus, and other pertinent sources. The major potential of blockchain in Industry 4.0 is discussed in this paper by Mohd Javaid et al., published in 2021. For insights, a number of Blockchain technology's drivers, enablers, and related capabilities are examined. Also covered are various Industry 4.0 spheres and sub-domains for the implementation of Blockchain technology. Finally, fourteen key applications of blockchain in Industry 4.0 have been found and examined by the writers [35]. Industry 4.0 is evolving due to a variety of new breakthroughs and the possibility of enormous potential. Each piece of this technology would improve the process and work together to provide results that are enhanced.

Theoretically, the immutable append-only decentralized ledger of blockchain technology makes it the ideal method

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for data storage. Data storage is guaranteed to be dependable, trustworthy, and transparent by the nature of the blockchain system. However, storing a significant amount of data directly on the blockchain is ineffective due to the full-replication nature of the blockchain. The decentralized file systems that are currently in use are reviewed and analyzed in-depth in this study. The focus of A. Ismail et alstudy 's from 2022 was on systems that could support big, frequent data writing while still enabling quick and simple data retrieval for blockchain-based applications. The trick, in the author's opinion, is to figure out how to get those efficiency results while still maintaining the essential decentralized elements of blockchain design [36]. In light of this, they evaluated the charges associated with utilizing nine cutting-edge decentralized file systems as well as their latency performance.

Because it has an impact on our personal, social, and public lives, information technology has been recognized as an emerging technology throughout the past two decades. In this way, technology has significantly improved quality of life. To assist in management decision-making, management information systems gather data from multiple online systems, analyze the information, and further report the data. In this paper by Kareem Kanaan et al., (2019), the management information system utilizing block chain technology in an e-commerce firm is largely examined and highlighted. Thus, based on a number of research in the literature, the report gives a systematic review. Using the relevant keywords, a thorough review of management and business process journals is conducted. In light of this, the study concludes that MIS utilizing block chain technology is readily acceptable in an e-commerce [37]. The MIS has a number of benefits that have been compiled from related studies in the literature. In order to comprehend the fundamental operation of the management information system utilizing blockchain technology in an e-commerce firm, the assessment results are sorted and then summarized.

Many scholars and professionals believe that blockchain technology has the potential to change the world. Numerous trials, use cases, and even operational implementations across various sectors, including finance, real estate, supply chain, and retail, were made possible by the predicted benefits of blockchain in a number of industries. This essay provided a concise overview of the fundamental capabilities of blockchain technology and the various ways in which it might lower the cost of financial transactions. This report also included a summary of all use cases and implementation plans carried out in various market areas. This article by Botros Kfoury (2021) had the objective of evaluating the contribution of blockchain in lowering the cost of financial transactions in the retail sector. Six subject-matter experts were interviewed in order to accomplish the goal of this article, which was to review the relevant literature in-depth [38]. According to the report, blockchain may both directly and indirectly lower transaction costs in the retail industry.

Numerous studies have studied the new blockchain technology and its uses in enterprise resource planning, management, and accounting systems (ERPs). The constraints of these centralized systems can be overcome by transforming the architecture of today's ERPs with blockchain technology (BT). This study has two objectives. First, Kitsantas et al study 's from 2022 defines and examines the implementation of an inventive architecture for a Blockchain as an Ecosystem (BaaE) platform that proposes a theoretical framework for Triple Entry Accounting (TEA), which will revolutionize the way that accounting is currently done. Second, the study examines how cost management, supply chain, and inventory management are integrated on BT, outlining the major obstacles and advantages and proposing a research agenda for the future. An substantial amount of material from 81 publications is explored qualitatively by the authors. Exploring, addressing, and using this new BaaE platform technology that might be combined with TEA is the paper's innovative contribution and main goal. Since there is little research evidence in this area, the study also evaluates the theoretical, technical, and business elements of TEA [39]. The study also looks at BaaE's effects on cost management, supply chain management, and inventory management from an ecosystem perspective. This initiative can help businesses and professionals comprehend and research this developing technology further.

Protection of privacy is important to many industries. Differential privacy is a developing technology that safeguards user data on an individual basis. For datasets with frequent searches, it still has drawbacks including the quick accumulation of privacy costs. This study investigates the use of blockchain, a secure decentralized ledger, to overcome this constraint. The differential privacy algorithm's noisy responses will be tracked via blockchain, which will also permit some requests to reuse previous responses. An interactive decentralized web application is used as the demo of the proposed blockchain-based privacy management system in this study by Leongmei Han et al. (2020). The generated demo demonstrates how utilizing blockchain will enable the overall accumulated cost of privacy to dramatically decline [40].

Industry 4.0's hyper-connectivity has led to a rapid increase in the amount of information as well as an expansion of the regions and assets that need to be safeguarded. Due to the diverse and numerous security solutions employed to secure

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the expanded assets, information security has resulted in a significant economic expense. Additionally, it has made it difficult to manage those problems due to factors like cross-talk, an abundance of security events and log data, etc. For effective security management in this security environment, an organization should identify and categorize assets based on the value of data and their security perspective. Then, appropriate protective measures should be applied in accordance with the assets' security classification. However, there are still issues because it is necessary to coordinate multiple security measures in order to safeguard the sensitive assets. In this research, Wan Hong et al.(2021) suggest a blockchain-based information categorization management service that employs a model of the value of data and a security standpoint. It logs all asset management and asset classification transactions on a blockchain distributed ledger [41]. The proposed service uses blockchain to provide security measures at the platform level rather than at the level of individual security solutions, reducing the assets that need to be secured and the security solutions that need to be deployed. This suggested service allows economic security, offers a new integrated security platform, and exhibits service value in the fast-evolving security environment of Industry 4.0.

III MATERIALS AND METHOD

3.1 Integrated Financial Management Technology

In this study, a general blockchain architecture that can be used for business finance management has been designed in order to fully use the traceability, trusted database, openness, transparency, as well as decentralized properties of blockchain technology. The architecture is made up of the application layer, network layer, data layer, incentive layer, contract layer, and consensus layer. Figure 1 displays the Blockchain integration in financial management system.

a. Data Layer

The data layer, it is kept in the decentralized ledger and includes things like annual budgets, plans for how money will be spent, data on how risks will be handled, etc. Every node in the financial management system is equipped with a data backup, allowing for data sharing as well as system robustness maintenance. In the event of a node failure, the system won't completely disintegrate.

b. Network Layer

Peer-to-peer lending (P2P) networks are used by the blockchain network as a networking strategy. This method enables the transmission of block and transaction data across nodes. The networking mode has the characteristics of dispersion, autonomy, and equality. Each node can contribute to the security and stability of the blockchain network thanks to the data-based procedures for verification and dissemination. The research classify all nodes as either "light" or "complete" based on the requirements of the underlying system. The full nodes are in charge of

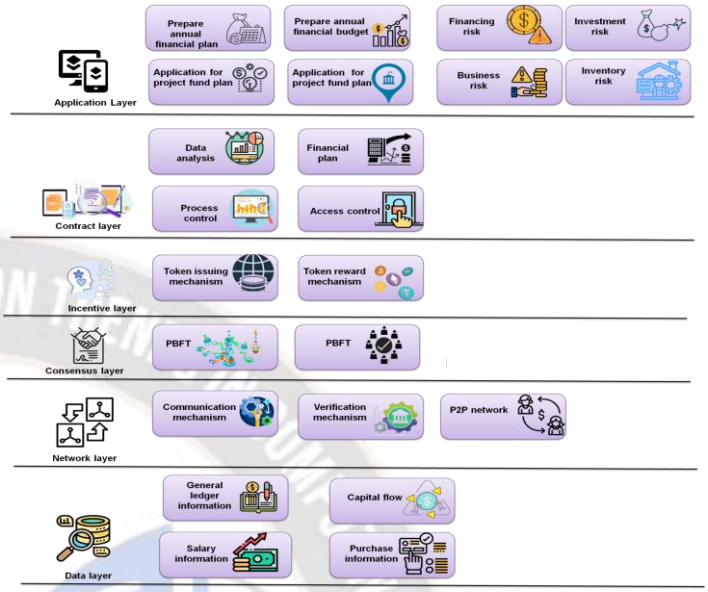

Figure 1: Blockchain integration in financial management system

storing information, while the light networks are in responsible of responding about the information, verifying it, and dispersing everything.

c. Consensus Layer

The decision layer's agreement method ensures that all nodes in the blockchain continue to store the same accurate information at all times. Each blockchain gadget will eventually settle on a common protocol, making authorization verification uniform across the network. From the perspective of system performance requirements and application environment, the network nodes in this study are validated using EFT, PBFT, and other algorithms to ensure they can realize no bifurcated, high throughput, and millisecond data transaction.

d. Incentive Layer

This study sets the stage for the Ken compensation management issue mechanism within the financial management system, with the hopes of enhancing the synergy and excitement of financial workers and improving the efficiency with which firms manage their finances. The system will provide the financial worker a token and judge their performance with it. Ken's incentives, penalties, and transformations are all generated mechanically by a smart contract that is completely fair, objective, and open with its facts.

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e. Contract Layer

The sector of smart contract innovation has mainly focused on creating its associated protocol codes or technical applications from the point of view of confidentiality, enforcement mechanisms, and contributes to higher methodologies in order to improve the efficiency of data transactions and analyze purchases, manufacturing, as well as other information thru the payment systems.

f. Application Layer

Data exchange and a mapped-out plan for business operations are two benefits that the application layer can bring to the table for the finance department. Adding smart contract technology into the mix can boost the already high degree of automation present in a collaborative workplace.

3.2 Cost information management- Blockchain technology (CIM-BT)

The suggested technique assists in identifying the I [j,j + 1] operation as part of the confidence obtained from cost prediction. This should get i(j + 1) using the time interval k and the boundary conditions j + 1. The reliability of the cost prediction blockchain function, as well as the expected likelihood of i(j) judgements, may be improved by using a stochastic modification module, which also delivers the final product. All of these terms are defined in the following Equation: (1).

$$b'(j) = \sum_{j+1}^{y} y\left(b(j) + \sum_{i=1}^{j} i[j, j+1] \right) \qquad (1)$$

In order to assess the cost prediction blockchain standard, a rule is constructed around the unit n i for calculating costs. A unit g is input into the conventional data b(r) device. The behavior control is in constant contact with unit d. After finishing the procedure, you'll get a neutralized combination. Both signs & weightlifting are real values that may be entered into an input node. The data has no effect on these measures. The end output is quite close to the actual data. It is possible that the signal a q, in conjunction with the truck full to z q, may produce such entities, as shown in Equation (2).

$$i = \sum z_q a_q + \sum_{i=1}^{j} i[k, k+1] \quad g = 1,2. \qquad (2)$$

The data input P required for implementation, as stated by Equation (3).

$$P = \sum_{i \to a}^{z} i_1 + i_2 = \sum_{j=1}^{z=1} z_1 j_1 + z_2 j_2, \qquad (3)$$

Blockchain production, denoted by P, is computed as the accumulated transfer work of blocks, denoted by f(t), which may be a sigmoid function as shown by the following equation: f(t)=(1 + e(-t)(-1) (4).

$$f(t) = \sum f(P) = \int f(z_1 j_1 + z_2 j_2) + \sum_{i \to a}^{z} O_1 + O_2 \qquad (4)$$

For the purpose of using this BT based AI makes digital cost information management and system records, a set of cost prediction blockchains was established. These are grounded on both hard data and blockchain-based price forecasts. Here are a few use cases for blockchain technology.

This mode command technology is advantageous because it not only makes use of the entry point, available spectrum, and data transmission, but also broadcasts h ((i)) online access to facilitate the completion of tasks.

$$z_q^i = \sum_{Q=1}^{C} \alpha_i L \log\left(1 + \frac{\left|i_{q,a}\right|^2 C_{q,a} i^{-a}}{\sigma^2} \right) + \sum f(P) \qquad (5)$$

Terminal products, l (-a), node facility distance, b (-a), and interaction noise level 2 are all variables in Eq. (5), where q represents the fraction of available internet bandwidth used for terminal update-specific assignments, i (q,a) denotes function between terminal and access point and C (q,a) stands for terminal products. Like i q uplink data transfer efficiency, i q downlink data transfer efficiency is defined as:

Accordingly, we may define the efficacy of data transmission through the i q exchange as follows: (6).

$$y_q^j = \sum_{i=1}^{M} \beta_q T \log\left(1 + \frac{\left|i_{a,q}\right|^2 M_a l^{-c}}{\sigma^2} \right) + \sum_{q=1}^{z} z_q^g + \sum_{q=1}^{a} \left|i_{a,q}\right|^2 M_n i^{-c} \qquad (6)$$

Where q is fraction of throughput frequency used by blockchain an operationally-capable terminal, I is the correlation between the entry point and the terminal during an economic downturn, and M is the connection speed of the underlying network.

The gateway additionally does an approximation of job n (i) if it is not offloaded to a network edge. The time difference between the two tasks, expressed in Equation form, is as follows: (7).

$$X_i^n = \sum_{k=1}^{n} \frac{g_i}{g_i^k} + \left|g_{n,i}\right|^2 X_n g^{-b} + \sum_{i=1}^{n=1} \frac{\left|g_{n,i}\right|^2 X_n g^{-b}}{\sigma^2} \qquad (7)$$

Where g ik represents the regional task-organizing capacity of terminal g i communication processing. Thus, the total lag time is shown in Equation (8).

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$$g_i^m = \sum_{m \in g} (1 - \alpha_i) g_i^m + \sum_{k=1}^{n} \frac{g_i}{g_i^k} + |g_{n,i}|^2 X_n g^{-b} \quad (8)$$

Because of this, we construct a hybrid artificial neuron by connecting the incoming data to a neuron by a variety of operations and then calculating the outcomes with Equation (9).

$$g_i^n = \sum_{i=1}^{n=1} \frac{m_i}{g_i^n} + \sum_{k=1}^{n} \frac{g_i}{g_i^k} + |g_{n,i}|^2 X_n g^{-b} \quad (9)$$

These adjustments make rising computing costs crucial for cost prediction of blockchain's neural planning. The delay time throughout the frequency range is directly proportional (10).

$$g_i^n = \sum_{i=1}^{k} \frac{g_i}{b_i^k} + \sum_{m \in g} (1 - \alpha_i) g_i^m \quad (10)$$

There was some description of blockchains for use in enterprise-wide, deep learning–based cost information management. Cost prediction blockchain data has been used to corroborate this, and Equation (above) shows that the server's computation time is similar to the scale of a single stands and the server's processing capacity (11).

$$b_i^f = \sum_{i=1}^{X} \frac{f_i}{X_i} + \sum_{i=1}^{n} \left(1 + \frac{|g_{i,n}|^2 Y_{i,n} g^{-n}}{\sigma^2} \right) \quad (11)$$

The cost information management controller architecture is predicted to perform very well in comparison to a accounting control. This results in the transmission of Equation (12).

$$s_i^n = \sum_{i=1}^{s=1} s_i^c + s_i^h + s_i^f + \sum_{G=1}^{Y} \alpha_i R \log \left(1 + \frac{|g_{i,n}|^2 Y_{i,n} g^{-n}}{\sigma^2} \right) \quad (12)$$

Therefore, the time required to complete the process of discharging s I to the edge device is sent as in Equation (13).

$$X_i^n = \sum_{i=1}^{n=1} \alpha_i s_i^n + \sum_{i=1}^{s=1} s_i^c + s_i^h + s_i^f \quad (13)$$

If you want to know the one most essential indicator of crucial operational behavior associated with cost data management for fitness, go no further than Equation (14).

$$min\ g = \sum_{i=1}^{n} (g_i^n + d_i^n) + \sum_{i=1}^{n=1} X_i^n \quad (14)$$

When f1 is placed directly on the screen, the sensor will activate. The resulting equation, which is shown on the input screen, is as follows: (15).

$$s.t.f1: \sum_{h_i \in d} m_i \leq m_y + m(k) + \sum_{g=1}^{k} g[k, k+1] \quad (15)$$

Any business that cares about its clients should have a sophisticated cost information management plan. An easy-to-implement and -enforce blockchain architecture aided the suggested f2 method (See Equation (16)).

$$f2: \sum_{g_i \in d} \alpha_i \leq 1 + \sum_{h_i \in d} m_i \leq m_y + m(k) \quad (16)$$

Equation (17) is a novel way to organize the f3 suggested system, which incorporates not just sensory data but also a cost prediction mechanism based on blockchain technology.

$$f3: \sum_{g_i \in d} \beta_i \leq 1 + \sum_{h_i \in d} m_i \leq m_y + g[k, k+1] \quad (17)$$

Attractiveness may be defined in terms of the time latency, and shorter latency periods are associated with greater athletic performance, as shown by the fact that f4 in Equation (18) is to decrease the delay time of an energy economy.

$$f4: \sum_{i=1}^{n=1} m_i^n \geq 0, \forall i \in d + \sum_{i=1}^{d=1} d_i = \frac{1}{g_i} \quad (18)$$

The Equation (18) is used to compute the d_i strength and endurance value.

IV EXPERIMENTAL RESULT

The study proposed the blockchain promotes the innovation of operation cost information management system. Experiment used security level, scalability, run time and throughput. Existing methods such as Cloud [31], Big Data [32]and Internet of Things [IoT] with Data Mining [DM] [33] are compared to the proposed work [Blockchain Technology].

A basic primitive's security level is a gauge of how secure it is, such as a public key or digital signature function. However, different approaches have been developed that more accurately represent the costs for an unauthorized person. Security level is typically stated in "bits," where n-bit security means that the exploit would need to carry out 2n operations to break it. There is no obvious biggest liability since this makes it simple to compare techniques

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and is helpful when mixing different primitives in modified techniques.

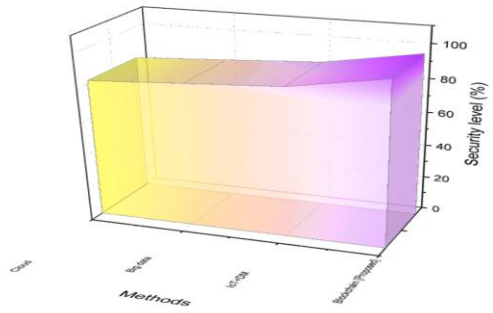

Figure 2: Comparison of the security level

The security level comparison is shown in Figure 2. The proposed method blockchain shows more significance security level than the other existing methods like Cloud, Big Data and IoT+DM. The results show that the proposed Blockchain Technology (BT) have obtained highest security of 95% with the lowest marking of 81% by Cloud Computing (CC) technologies. This blockchain technology is mandatory for the operational cost information management to avoid sharing or distribution of details. Operational cost information plays a crucial role in any organization and hence BT will act as a significant technological advancement in this application. The numerical representation of the security analysis is presented in Table 1.

Table 1: Comparison based on Security and Scalability

Model	Security	Scalability
Cloud Computing	81%	74.5%
Big Data	82%	83.0%
IoT + DM	92%	64.0%
Blockchain (Proposed)	95%	93.5%

A service's ability to adapt its expense and performance in response to variations in system and application computational requirements is known as scalability. A blockchain network's scalability refers to its capacity to accommodate increases in both the number and volume of network nodes. The ability of a network to accommodate more production processing is known as scalability, and it is a key component of blockchain networks. Therefore, scalability is crucial for Blockchains future development.

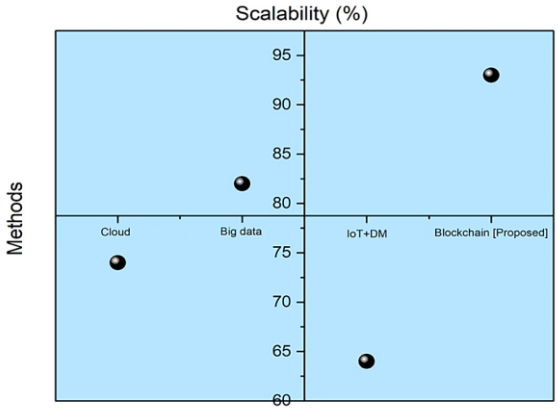

Figure 3: Scalability of the proposed and the existing methods

The suggested blockchain has more scalability than existing approaches like Cloud, Big Data and IoT+DM and is presented in Figure 3. In this BT for cost management application, scalability of the model plays a significant role when the number of transactions is increased. In this research, transaction can be information to be monitored and maintained in any given organization. The specific organizations, that may be in need of this blockchain technology includes financial sectors, educational sectors, and others. From the resulting graph (Figure 3), it can be seen that the proposed system achieves 93.5% of scalability by making a difference of 10% increase in comparison with the Big Data Technology (BDT) and the numerical representation is provided in Table 1.

A phase of the computing process is runtime. It is the period of time when a system is simultaneously being executed by all external instructions required for proper operation. Some of these extraneous commands are built into programming languages and are known as runtime environments or runtime systems.

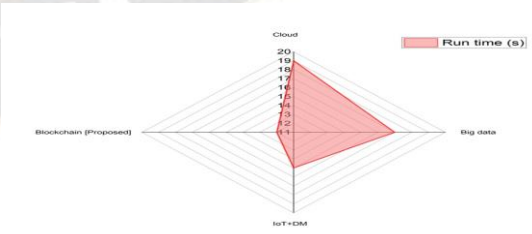

Figure 4: Comparison of the run time

The run time are shown in Figure 4. When compared to existing like Cloud, Big Data and IoT+DM, the suggested blockchain has minimal Run time. Besides the security level of the application of technology, it is also significant to monitor the runtime of the application. The duration for detecting the issues should be very minimal and finding the issues in securing the cost operations of an organization.

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From the results, it is seen that the blockchain technology recorded the least runtime of 11s when compared to other existing models (Ref: Table 2). This minimal runtime is 8% less when compared to the Cloud Computing Technology.

Table 2: Comparative Analysis of Runtime and Throughput

Model	Run Time (s)	Throughput (Byte/ms)
Cloud Computing	81%	74.5%
Big Data	82%	83.0%
IoT + DM	92%	64.0%
Blockchain (Proposed)	95%	93.5%

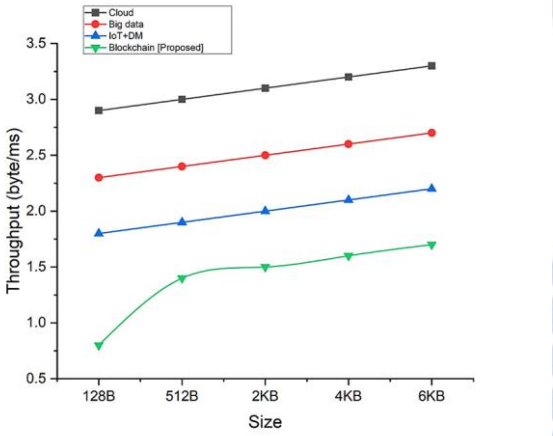

Figure 5: Throughput of the proposed and existing methods

Throughput refers to the number of input that a particular system can process in a specific time period. It covers a wide range of technologies, along with many facets of computer and network systems as well as organizations, and is used broadly. The suggested approach blockchain has a greatest throughput compared to current methods like as Cloud, Big Data and IoT+DM. The proposed BT has achieved lesser throughput of 0.85 Bytes-per-minute for 128B of data and 1.7 Bytes-per-minute for 6KB of data (Ref: Table 2).

V CONCLUSION

With the proliferation of IT, there has been a corresponding increase in the volume of data, especially financial data. The prevalence of fraud makes it impossible to determine the origins of business financial data and the relevant personnel. Most employees are unable to make suitable queries on the required financial statements, indicating that there are serious problems with nonstandard behaviour and a lack of important financial data of these organizations. Because many similar problems were not adequately addressed, it has constantly made financial information management more complex for businesses, constituted a threat to the entire business ecosystem, and harmed the interests of multiple stakeholders. In recent months, blockchain has attracted a lot of interest, which has contributed to the rise in popularity of crypto currencies like Bitcoin and Litecoin. Data is hard to forecast and manipulate because of blockchain's centralized control, confidentiality, veracity, and lack of bravery. Because of its inherent anonymity and the lightning-fast transfer times necessary for firm finances, blockchain has arisen as a fresh solution to problems with data management. The blockchain is integrated into an overarching management platform that is designed to facilitate the financial management framework and information processing strategy made possible by blockchain technology in order to create a transparent and secured transmission route for blockchain data. The proposed Blockchain solution is compared to current methods in terms of security, throughput, execution time, and scalability.

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