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BLOCKCHAIN FOR THE CONSTRUCTION AND REAL ESTATE INDUSTRY

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Abstract - The booming use of blockchain technologies and the unexpected limelight has attracted everyone's attention. Usage only grows over time but is often used as a means of gaining wealth instead of technological developments in the financial and technical field. What is keeping it down is the constant usage of by people rather than the broad corporation. It can drastically stop money laundering and the bluffs around it. Big companies and real estate firms also have very little confidence in blockchain's actual use and benefits. Perhaps because of their slow digitalization and uncertainty about the change in the tech world. The world is heading toward an intelligent future, so it makes good sense to get away from obsolete banking and old transaction practices that are not very convenient. The blockchain network is completely capable and will certainly bring a halt to all the industry's illicit movement of capital. We propose improving the present system, which has undergone little change over the last decade or so, and the contrast between speculation and reality is further found in the paper

Key Words: Blockchain, Decentralized Ledger Algorithm, Construction Industry, Private and Public Blockchain, Smart Contracts, Building Information Model

1.INTRODUCTION

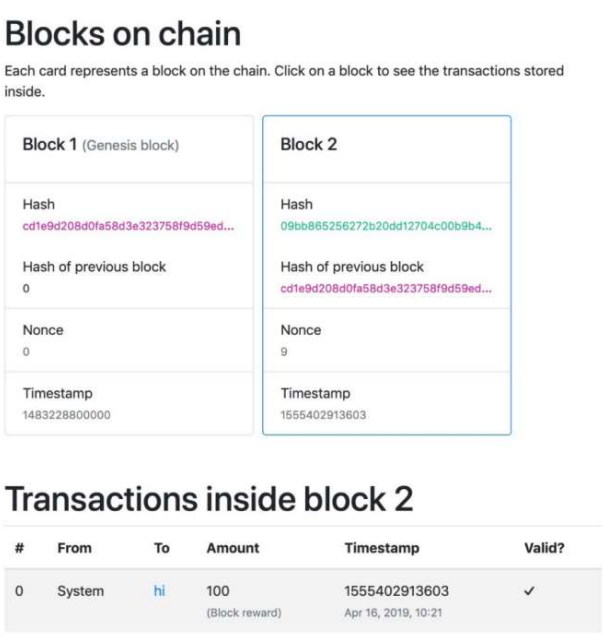
1.1 Background

A blockchain is a software protocol that uses blocks to store information. A block is an entity in a blockchain system that stores and alters the information based on a majority agreement, known as "consensus algorithm" or "proof of work"(PoW) based on the type [12,2,3]. After the data is registered, it would not be possible to reverse the data in any given block unless all subsequent blocks have been changed, requiring a majority agreement in a private blockchain system. The technology blockchain is highly secure and offers high anonymity due to its decentralized nature and the P2P (peer-to-peer) network [1,2]. This ensures that the data properties are incorruptible and guarantees accountability. Besides, transparency, anonymity and privacy are being strengthened and the distrust and corrupt intentions are being reduced [6,11].

1.2 Blockchain Mechanism

A block that is part of the current blockchain consisting of the previous block hash and the next one. This lies between the blocks and for the next blocks, the iteration begins. The hash value is a highly secure encrypted 256-bit value and can not be accessed via brute force attack [20]. Nodes are involved in modifying or removing blocks [2,4]. The blockchain network has two key types, private and public [2]. The only difference is to conclude the transaction by validating the transaction, which is not the case in the private blockchain network, by multiple anonymous players known as "miners". However, the process only continues in a private blockchain network if most nodes accept the transaction(51 percent of nodes). This method of decentralized ledger process gives power and access to all nodes instead of following a leader or decision-maker to have a say in the ongoing process which implies the use of the principle as defined by many as "Wisdom of the Crowd". The transactions are in bitcoin or any other cryptocurrency but not in real money, which saves the participants' transaction fees.

There is a big misconception that distributed ledger and blockchain are alike. Blockchain is predominantly public and anyone who becomes a node can participate in the transaction. That explains the use of miners in a public network to validate the network transaction. They are responsible for validating the transaction as soon as it enters the global blockchain domain. For their job, they get to keep a small reward or commission. However, this is not the case with decentralized ledger technology that uses the mechanism of blockchain in a more private room. The network participant nodes will participate and have access, as in the case of a public network, to verify a transaction. The Majority of nodes would have to permit to complete or validate something, thus giving it the name of "permitted ledger" among the enthusiasts. Blocks keep the hash value of the previous block to maintain the integrity of data, shown in Fig.1. Block 1 which is the starting block has its starting hash. When a new block has created the hash of the previous block is used in Block 2 which is a new block. This iteration continues further, forming blocks that are chained by hash values. However, 51% attack is an underlying concern, hypothetically possible but practically very impossible in a public chain. If blockchain is efficiently implemented and they are correctly in use, it does not matter much [10,16]. Because of these factors and concepts, it can be implemented to improve transparency and trust between dealers and contractors in the construction and real estate industry.



1.3 Methodology

- To enhance our awareness of the coming developments and techniques in blockchain technology we have gathered several research papers to obtain a comprehensive awareness of blockchain and its benefits in the decades to come.
- To understand the fundamental issues in the building and real estate industry, we studied the value of the market and concluded that this is one of the main sectors for a country and needs significant digitalization and change.
- The fundamental problems related to the monetary and ethical questions were understood and the confidence replaced by evidence[4] in the proposed model.
- To such a huge investment of money, existing models and procedures are not very partial and safe. High risk, high reward situation.
- The Detailed study showed that the blockchain can be used to boost the industry with very little initial investment and increase productivity. The program proposed may well be adequate to reduce the current problems and failures.

2. LITERATURE REVIEW

Blockchain is a data storage structure that provides high data security and privacy. If the data is written on a block, re-writing the data into a traditional blockchain system is very difficult. The continuous blockchain is interlinked by the use of a mathematical attribute known as a hash. To get an idea of how secure the hash value is, Zhu concludes that an attacker's chance of success is around 0.0000006 [1]. If the data were to be changed in a hypothetical situation, the blocks will have to be changed back to the starting block which makes it very unlikely. Although it can be done with small nodes in a private network. The properties like decentralization, immutability and cost-effectiveness make it an apt tool to master [2]. The different sectors which are also capable of implementing blockchain include finance, medical, security, biometrics, data management and government tenders [10]. As described earlier, a 51% attack occurs when a malicious actor controls a sufficient proportion of computing resources in the network so that it can create and validate blocks faster than the rest of the network can, which leads to the network accepting the blockchain version for the attacker as "the reality." This can also delete older transactions if a block beginning from an earlier block is able to create a new "longest chain," since such transactions will not be included in this longest chain [16].

Implementing the Public Blockchain for Government Procurement is not acceptable due to the anonymity feature that it offers to the miners or a bidder in this specific case. Government procurement, also known as government procurement, is Government agencies procurement of goods and services. That is, government agencies are soliciting for the products and services that they offer to the public business sector. Although a public network system may be used for different sectors or a particular activity, it depends entirely on the body that controls the auctions and offers to overcome the ever-growing conflict of confidence and risks in the industry [19].

A private blockchain operates between the ledgers in a transparent and distributed manner. There, the ledgers have a say in what transaction will take place. When the majority only agrees then the transaction will take place and all blocks will be updated. One advantage of blockchain over conventional framework is that all the ledgers function as a network-wide database [9]. In case of any code alteration if all the blocks do not have the same hash value then the transaction is dismissed. Because of the government regulations and protocols, this type of transaction is very good for the construction business. No third party, such as banks, dealers or brokers, is involved that saves a lot of money.

BIM is a holistic resource for getting the collective response of all building and development stakeholders. Building Information Model (BIM) was used to improve the building industry, but due to its lack of confidence and passive customer engagement, it was unable to bring about significant changes [14]. Blockchain can reduce the administrative costs that are a long-standing issue with BIM [15]. After the invention, the use of Electronic Document Management

(EDM) has increased but blockchain will provide faster, cheaper and more trustworthy infrastructure. The cost of a third party's pay has always been an issue [18]. Significant improvements are yet to be apparent. Nevertheless, Srinath Perera suggests that blockchain and BIM could be combined to give the construction industry solidity and speedy operations [9]. Žiga Turk demonstrates that the blockchain network will integrate BIM servers to improve productivity and provide BIM clients with a better solution [12]. He also explains the need for a decentralized approach to improving the system. A Cortex analysis reveals that 57 per cent of the projects fail due to lack of customer engagement or lead to expensive rework [12]. Furthermore, this situation leads to the end of the deadline, which hinders

- the reputation of the company or organization
- leads to the money wastage of the investor and the clients
- waste of resources and manpower
- increasing the overall budget for the project

The Construction Industry is a very collaborative and intense sector. Apart from the completion of the project, quality and service are strictly monitored and should not be compromised at any cost. Various parties, such as contractors, builders, architects, clients and investors, are working together. Their timely advice and commitment is crucial to the completion of the project [9,13]. The industry has been plagued by ineffective banking schemes, lack of coordination, poor management of the supply chain, denial of payment and fraud [2,4,5,6]. The involvement of political influence in large projects is also a concern.

Blockchain provides an opportunity for all the parties involved to work together to address small obstacles collectively. On the construction site, where the quality of the goods is not optimal, the delivery may be stopped by informing all parties that the materials were not suitable. This goes with all the members included, if their service is not good, the transfer of money would not take place [5,7] Thus, all the parties would give a good performance which would eventually increase the quality of the final product. When the service is not successful all-inclusive members will in the future refrain from engaging with the guilty party. It would be possible to trace the goods in real-time from the warehouse to the construction site [3]. Reliance on third parties could be reduced drastically.

Smart contracts will open the door for small individual firms to work together to accomplish a shared objective. Trust and integrity should not be compromised by the use of Blockchain [6,14]. Promoting the use of blockchain could minimize cases of bribery and corruption [14]. For personal gain, the quality of the project will not be affected. About 60 % of the population will live in urban areas by 2050 [17]. Such rapid urbanization demands the creation of intelligent cities. The building industry must step up to make cities livable. This will boost company efficiency to save money and unnecessary purchases. It does not only help implicitly the introduction of the intelligent community, smart governance and intelligent logistics [17]. Blockchain is the alternative to data security and unsafe banking policies. Enterprise Resource Planning (ERP) frameworks and automated workflows have reached frameworks for design and development, Building Information Modeling (BIM), and Enterprise Asset Management (EAM). Most recently, the focus was on Internet of Things (IoT) with RFID software, as well as solutions for a drone, scanning, and imaging. However, all those reforms have made only marginal increases in project productivity. The amount of data collected has undoubtedly risen exponentially, but the building industry as a whole is still keeping up with inflation.

3. PROPOSED SYSTEM

The system we have implemented aims to stop the illicit movement of funds, improve trust between partners, reduce the likelihood of project failure and save extra costs. The program can be applied for both personal (an entity or an enterprise) or government projects. The framework uses a private blockchain network to allow clients or managers to connect to potential partners for project completion. The different members such as contractors, engineers, architects, transporter, and the supplier will be selected by the customers based on the services they offer the customer to provide. This case of an option, however, does not extend to public projects. The highest bidder is chosen for tenders. Similarly, among the participants, we also suggested the concept of bidding. Using blockchain will ensure that all formalities are completed as soon as possible, and there is no delay in payment and official works. In fact, decision-making and meeting in person will not be such an issue. The selected participants would be included in the blockchain network of the project where they could communicate directly with the project directors. The highest bidder from each sector will be selected for a government contract. This would ensure fairness in the procurement of tenders and nothing is pre-decided. Partner selection should be solely on the service that they offer. In the end, therefore, project efficiency increases. Completing the payment would mean the transaction would not involve any third party. It would save the tremendous transaction fees paid to the banks because the consumers do not have any other choice. Fig.2 systematically describes the flux of the proposed method.

The first significant step in the program is the selection of possible project-fitting partners and contractors. When presenting the concept of a project it is very important to find possible partners to help complete the project. This can be

achieved very quickly and easily with the blockchain. Regardless of any requirements, all participants will be linked to the blockchain network.

The relevant parties will then be chosen based on the tenders' bindings and the standard of the service that they provide. Nonetheless, critical considerations such as cost-effectiveness, product efficiency, success levels of previous projects should be weighed before any agreement is concluded. If the QoS (quality of services) proposed is not up to the mark then a decision will be made for the next possible client. This will mean there is no prejudice and everything was done in compliance with the procedures.

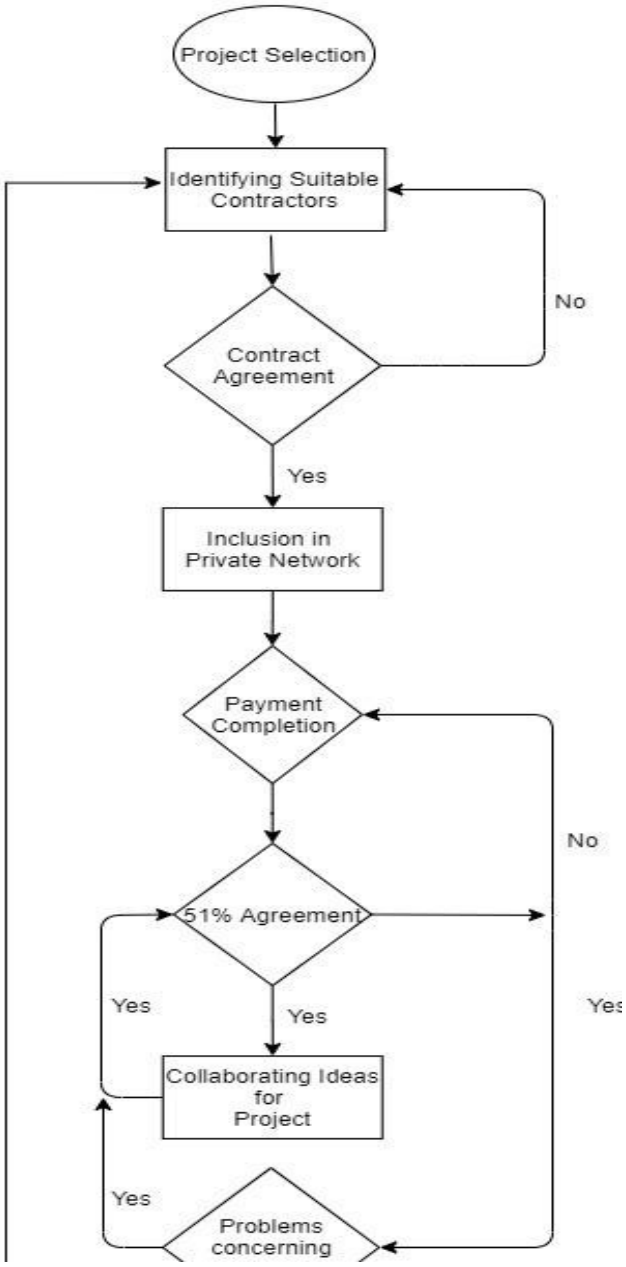


Fig -2: Working flowchart of the proposed system

The chosen contractors are then connected to a private blockchain network for the project. A comprehensive agreement and review will be made here about the project. All the information is exchanged between all the leaders. Both decisions should be made if the proposal is agreed by a majority of the partners. It would mean safeguarding the data that is shared among members. Any ideas or unique material that is shared can not be used without the owner's permission because of the encryption in the blockchain. This is very much possible, but if there has been some difficulty or hindrance in the project, the solution would only come into effect if the solution is decided by the majority of contractors. The ultimate goal is to use blockchain technology to provide better service and commendable work.

4.RESULT

Blockchain transactions are also safe through cryptography. An agreement is signed with a private key, which can then be further verified with a public key. When transaction data changes the signature is null. As a consequence, the block is skipped and does not make it into the sequence. This will also help in data protection, improving consumer trust, saving extra costs and reducing the likelihood of project delays that would also lead to a lot of the money being wasted.

By using the distributed ledger technology, BIM's inadequacies such as delays, lack of project awareness among the staff, confidence issues and data protection can be realized. Data Modification is out of option and data security is optimum. The blockchain provides full-time access to the project status and real-time monitoring of the goods to be used in construction. Blockchain should be used by real estate to save additional transaction costs to the banking business. It also helps multiple investors to work together and have a more engaging opinion.

The issues of corruption, money laundering and other unethical practices can be stopped by using blockchain for the benefit of the public. The collaborative approach used in construction is very challenging due to the involvement of various parties. Hence, using the distributed ledger technique among trusted partners can be used for delivering an effective project. Constant discussions and project analysis is a constructive approach. Very few issues can be found because blockchain networks have implemented tests for computers that would like to join and add blocks to the chain to address the trust issue.

By definition private blockchain is private (permitted). You offer permission to connect only certain parties you know about the blockchain (consortium). You are aware of those parties' identity. Technical protection is not there but social control. There is no way to remove ethical errors. If any of the parties misbehave or threaten to conduct the assault of 51 per cent they are thrown out of the consortium. You have the right to take part in decision-making but are not the decision-maker. The following table gives a gist of comparison between the present system and system proposed, if into implementation. To summarize and put in forward a better picture by

comparing it with the existing system in Table 1 on the various important parameters and factors

Table -1: Comparison of existing system with the proposed system on various parameters

S.No	Operations and Parameters	Existing Method	Blockchain Method
1	Transaction Time	High	Low
2	Banks for transaction	Required	Not Required
3	Transaction Cost	High	No Transaction Cost
4	Cost of Operating	High	Low
5	Data Security	Not Optimal	High
6	Processes	Partially Digital	Digital

5. CONCLUSION

With its core features: decentralization, durability, anonymity and data protection, Blockchain has shown the capacity for disrupting conventional industries. We provided an exhaustive overview of blockchain in this article. First, we gave an overview of blockchain technology including forms of blockchain networks and main blockchain characteristics. We discussed the issues facing the construction and real estate industries because a nation's development is directly dependent on the productivity and development of these two industries. We studied the current sub-par solutions and looked at blockchain's unique character. Problems such as worker mistrust, lack of project awareness, resource problems, premature project completion were key issues.

Blockchain's decentralized strategy means removing the decision-maker. This is a creative way of growing the influx of black money and ethical practices, particularly for government programs. Given very poor infrastructure, the government has often been criticized for supporting some particular corporations and conglomerates in these mega-projects. Finally, the goal is to help the building industry which would help directly in economic expansion and development.

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