Essay Topic: How can computing increase the productivity of the construction industry?

Introduction

In this day and age, technologies flourish like Artificial Intelligence, Blockchain and Augmented Reality & Virtual Reality (ARVR). I opine that the most influential technology in the upcoming construction industry would be blockchain technology, for which I would thoroughly examine in the following essay

According to IBM (2019), the blockchain technology is a shared, immutable technology that facilitates the process of recording transactions and tracking tangible or intangible assets in a business network. It is one type of distributed ledger technology with all network stakeholders sharing a scattered database simultaneously. It is undoubted blemished to equate blockchain with cryptocurrency, which is merely one of the countless possible application of such technology.

Put it simple, blockchain is a database, with the distinct feature of immutability and decentralization. In the past, we people have to rely on the third party like banks to facilitate transactions, because of our trust upon those institution. In these days, could the blockchain which offers the decentralized database to obsolete centralized institution and database?

Problems in Construction Industry

Construction industry is deemed as a contributive industry with inefficiency and intransparency. Most project work will be subcontracted to other parties as a culture. Blockchain is one technology which could bring enormous change to the entire industry.

Owing to multi-pronged stakeholder relationships, the payment procedure in the construction industry has long been deemed as inefficient and slow. When the payment is not liquid enough, there would be many aftermath problems caused. According to the Euler Hermes Quarterly Overdue Payments Report, late payments rose by a staggering 27% in 2015, which made SMEs like sub-contractors difficult to survive in business.

Most of the construction projects are seemingly entangled with conflicts and disputes, some of which being resolved by the means of mediation, if not arbitration. The phenomenon of conflicting interests could be addressed by high transparency and immutability of smart contracts.

From the perspectives of supply chain management, data of work and materials are entered into centralized database, where is unsafe and non-traceable. For instance, the main contractor can even hardly ascertain the source and provenance of structural materials as those data are not immutable. Those

Recommendation: Smart Contract Application

Smart contracts is a remarkable innovation from the blockchain technology, yet its hypothesis has been proposed in the 90s. Based on the definition of BlockchainHub (20XX), a smart contract is a computer code running on top of a blockchain containing a set of rules under which the parties to that smart contract agree to interact with each other. When certain predefined condition is achieved, the contract will smartly executed from coding. The input code is entered into blockchain immutably, which is secure and protected.

For the payment system issue mentioned above, smart contracts ascertains when certain predefined conditions attain, the payment (both cryptocurrency and fiat currency is achievable) will be distributed. Different stakeholders of construction projects could not fabricate nor postpone their payment according to automatic mechanism in this liquid and transparent way. Zeus Ecosphere is one of the pioneering companies to develop a contract management system which allows that all parties involved in a construction project can enter into a blockchain enabled project and contract management system.

For dispute resolution, smart contract could serve as an intermediary application, if not proof of evidence, as a means to resolve disputes among stakeholders.

Recommendation: Procurement and Supply Chain Management

The application of blockchain is by no means limited to the payment system. Let's examine how food security has been revolutionized recently. Intel has established the food supply chain system on the Hyperledger Sawtooth, one of the blockchain platforms, in order to keep track of the location, quality and provenance of food sources. The immutability and transparency has subverted the supply chain management in recent years. Sounds familiar with the supply chain in construction industry. Granted, the blockchain application could also trace the provenance of structural materials, thus eliminating the possibility of bureaucracy and falsification.

Recommendation: Collaborative Application with BIM

Better still, the blockchain technology has the potential to make collaboration with the existing construction technology such as Building Information Modelling (BIM). BIM has altered the gist of construction industry, and bring it into digital numbers. Merely believing that BIM is a digital design tool is an underestimation. Even better, BIM represents the entire project management and cost control system.

But which ensures the insertion of data into this modelling? The blockchain technology provides with highly accountable and transparent information, such as the provenance of building materials and their cost. On the other hand, the modelling work tells the modification order which can be capitalised by smart contract in the blockchain technology for further payment arrangement and material ordering work. The mutual complementary of these two technologies would make themselves an indispensable source of truth and standards for construction projects. Lohry (2017) suggested that "blockchain is especially useful in co-housing projects as it provides a useful tool for managing and recording changes to the BIM

model throughout the design and construction phases by using smart contracts to negotiate editing privileges and storing an immutable public record of all modifications to the model".

In French, BIMCHAIN is a start-up company developing similar applications. Further, the company takes advantages of other softwares like ArchiCAD and Revit to integrate its blockchain solution for the validation of modelling. Therefore, it is patently clear that technology applications in construction could bring synergy effects to complement each other.

Constraints in Reality

Due to the decentralized nature, the blockchain technology somehow sacrifices the efficiency and performance. The aforementioned hypothesis is indeed practicable. However in reality, our construction industry undertakes many unforeseeable changes like safety and design aspects during the project, which increases the difficulty of adopting the blockchain technology.

Another deficiency is that the blockchain technology hardly resolves the trust problem currently. Even though blockchain ensures its immutability and transparency, in which way could we ensure the correctness of information stored in blockchain? This question has been addressed by some articles that the combination of APIs can ascertain the predefined condition to execute smart contracts. Which begs another question: do we have to review the coding of smart contracts of blockchain? For smart contracts between client and the contractor, neither side shall take the role of reviewing the code due to conflicting interests, implying the intervention of third party to review the code. The aforementioned explains the existence of the 'Smart Contract Auditor', which is a third-party institution established to review coding of smart contracts. It is therefore hilarious to assert that blockchain fully resolves every trust issue because it merely shift the trust and accountability to another party.

Conclusion

Amara, the President of Institute of Future, has noted that 'we tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run. Despite the widespread application of blockchain into cryptocurrency, it seems that we have dedicated too much fancy and enthusiasm into such financial derivative. Instead, we should embrace every possibility this blockchain technology could bring, unleashing its full potential to make a better construction industry in the not too distant future.

Reference

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