A Next-Generation Smart Contract and Decentralized blockchain Platform: A case study on Ethiopia.

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Abstract: The advancement of the internet in the business world leads to positive and negative services to the world population. Especially e-commerce plays a critical role in the present business industry. However, security is the most basic criterion for doing all internet transaction activities. Different types of E-commerce are using in the present business industry. This paper presents the use of B2G E-commerce for smart contracts. This paper discriminates the difference between the traditional approach of contracts and smart contracts. Smart contracts are available in the business environment, but they are insecure. In this paper, new emerging blockchain technology is used for smart contracts. The use of bitcoin cryptocurrency is used for transaction purpose. Implementing the blockchain technology in smart contracts the process will make a faster, reliable, securable, and trust environment. Implementing the blockchain technology will improve the platform for the small scale contracts which can reduce the broker fees. All the transactions are openly visible and securable. The study convinces secure business transactions in a decentralized environment.

Keywords: Blockchain technology, bitcoin, cryptocurrencies, Smart contractors, and E-business.

1. Introduction

The traditional business is completely opposite to e-business because it is not so convenient because we need to go out and catch clients, the benefit of this traditional business is that they provide good service and gain customer's trust but the amount of energy wasted is not really worth it sometimes. Furthermore, traditional business waste energy because the need to travel a lot and quite a lot of paperwork needs to be done for one transaction and sometimes time and also waste time. Because of the increase in information and communication technology particularly the internet services which take drastic change from 2g, 3g and 4g the IPS services are very fast, the supplier and purchaser want to make the services faster. Using the traditional business the collection of money from the purchaser, using the offline banking system leads to more paperwork, it is a time-consuming process [1]. By the advent of e- commerce's into the business sector many companies started using e-commerce, like Amazon, eBay, flip kart, Alibaba etc. This environment is excellent for the completion of the sellers and buyers to maintain the feedback and satisfaction levels for both sides.

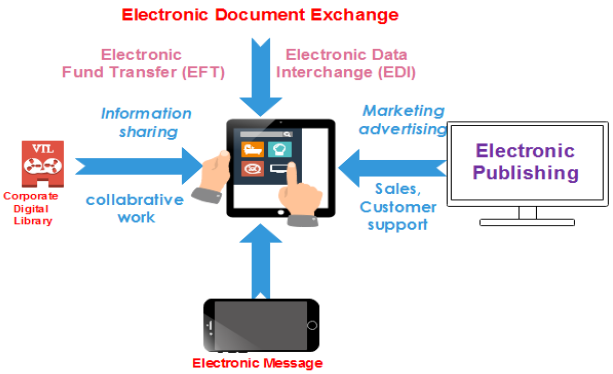


Fig.1 Block diagram representation of E-commerce.

E-commerce is, comes from the so-called 5-C-model (Zwass 2014), which the letter "C" includes Commerce, Collaboration, Communication, Connection, Computation. The main features of E-commerce, it enables the usage of credit cards, debit cards, and electronic fund transfer via bank sites. Provides the 24x7 services to the customers. It always helps the services to the customers like pre-sales and post-sales. The main advantage compared to the traditional business is faster, efficient, and reliable to customers and partners. The major types of E-Commerce are business-to-business (B2B); business-to-consumer (B2C); business-to-government (B2G); consumer-to-consumer (C2C); and mobile commerce (m-commerce). The main disadvantage in e-commerce is the security between sellers and consumers. Bank transactions can be hacked. The hackers have the provision to change the details of the goods [2].

2. Blockchain

Blockchain is a foundational emerging technology of the Fourth Industrial Revolution [3]. Satoshi Nakamoto [10] who is the creator of the cryptocurrency bitcoin in 2008 published the article "Bitcoin: A Peer-to-Peer Electronic Cash System", with the advent of bitcoin to blockchain technology [11]. Blockchain is a decentralized (distributed) electronic ledger system that records any transaction of value whether it be money, goods, property, work, or votes [4]. It is also an interlinked and continuously expanding list of records stored securely across a peer-to-peer network [5]. Every participant with access can simultaneously view information with no single point of failure, creating trust in the system as a whole. Blockchain aims to solve the problems of ledgers and contracts by sharing them in an unambiguous form between the participants of the business network. Blockchain can be referred to as a shared, distributed ledger with smart contracts. Bitcoin and Blockchain are not the same bitcoin is the payment system [8]. Bitcoin is a digital currency which is used to send and receive money across the world in a decentralized manner with minimum transfer fee. The Bitcoin network is pseudonymous and the Blockchain is fully public; you can view the entirety of the Bitcoin ledger. The benefits of Blockchain technology are Consensus, Consensus, Immutability, Finality, Identity, Security, Contracts [9]. List of applications of blockchain technology fund transfers, web payment transactions, decentralized digital market, secured supply chain, resourceful business management, and efficient retail management [12].

Blockchain is characteristically achieved by a peer-to-peer network, which is collectively dedicated to a protocol to communicate between nodes and verify new clusters. Blockchain is a distributed database of immutable records called blocks, all the blocks are recorded in the chronological order. Once data is recorded it cannot be changed. The main features of the blockchain are shown in Fig.2.

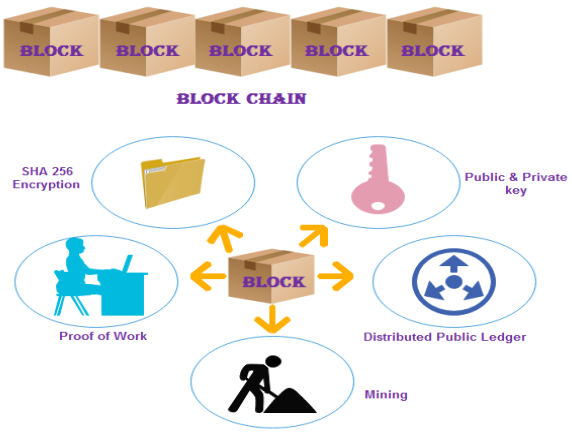


Fig.2 Representation of blockchain and its features

Blockchain makes the payment by using the bitcoin, which is a digital currency specially used for commercial use. The data created by the user it is first sent to SHA 256 algorithm, where the data is converted 256-bit encrypted code, the main advantage of the SHA 256 algorithm is it can be converted to 256 bit encrypted but vice versa it can't do. The block which it is created it has the private and public key the public key may be the email address and the block is distributed in the public ledger, the block which is created it is accessed by the public domain but it cannot be modified. The miners will solve the mathematical problems to link the block to another block [7].

3. Proposed Model for smart contracts:

Ethiopia is located in east Africa, also called "Horn of Africa". The economy of the country is growing exponentially. Currently, many projects are ruined by private and government organizations. Many of the projects are ruined by Chinese, Germans, Italians, Arabs, and India etc. Some of the small governmental works are running by the Locals. Some projects are running by the collaboration with some other nations. The government is always facing problems during the contracts and bids for the government works. The proposed work in this paper is the use of blockchain technology for smart contracts to support the Ministry of Ethiopia. Blockchain-based smart contract application provides a decentralization process was no middle person involved between consumers and merchants. All transactions performed by the customers are stored in a blockchain, encrypted and unaltered. Blockchain-based smart commerce platform has the algorithm which makes an open database that contains evaluated quality bids, review of customers and price list.

Step by step process for the smart contracts using the blockchain:

S.No	Description
1.	The use of blockchain for smart contracts makes the transactions secure and faster with decentralized.
2.	All the transactions use the cryptocurrency for the process
3.	All the application processes are made and registered without any fees.
4.	All the transactions made are secure because of high-end algorithms.
5.	Very low transaction charges
6.	No third party interference in the bidding.

3.1.Traditional bidding process:

In the traditional bidding process, the government or private organization releases the bids in the newspapers. The contractors get information regarding the bidding process. Initially, the contractor checks the criteria for the bid, he prepares the following documents like

1. Registration of license
2. TIN certificate
3. VAT registration certificates
4. Experience letters from the recognized authority.
5. Skilled employee list.

After preparing all the documents the contractor will send the quotation to the respective authority before the specific time. The authority responsible person will check the criteria of the contractors, who made the quotation for the specific person they will give the contract. Fig.3 shows clearly the step by step process and flow of the work to apply for the bids in a traditional way.

The main disadvantage of the traditional method is the documents can be easily forged. Even after the submission of the document the quotation can be changed with the help of inside authorities. Hackers can access the data easily.

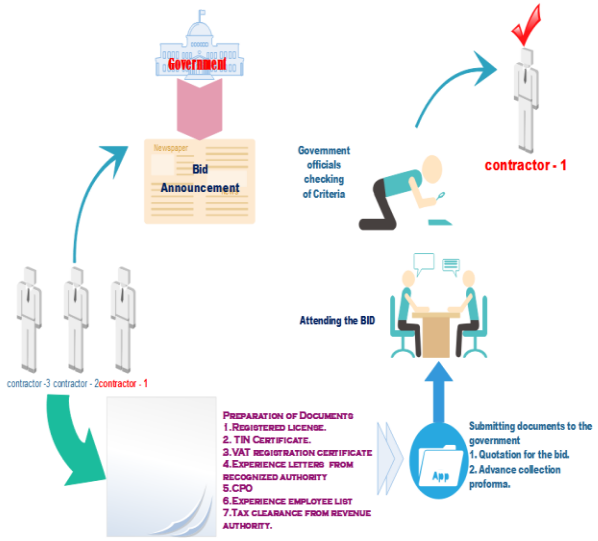


Fig.03 Traditional bidding process in Ethiopia

3.2.Smart contracts:

Smart contracts can be adapted in all sorts of contracts educational contracts, railway contracts, building contracts, water work contracts, irrigation contracts, electrical contracts etc. bitcoins can be executed in all contracts by using the cryptocurrencies in all circumstances and originations can program their contracts. The reliability is enhanced by one of the blockchain's key features, namely the fact that it is tamperproof. The application of blockchain to the smart contracts and the step by step process is enlightened below. First, when the government or private organization announces the call for contracts using the mass media like television, radio, newspapers, IoT etc. Different contractors will start bidding to catch the project. In this paper, we consider three contractors who will be in competition for the bid. Initially, each person creates the account to apply for the bid. Fig.4 shows the login flow chart to create the account.

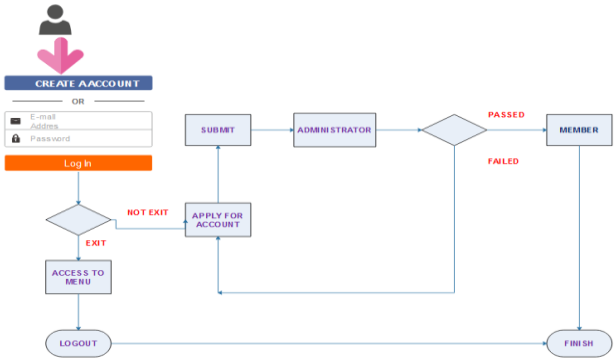
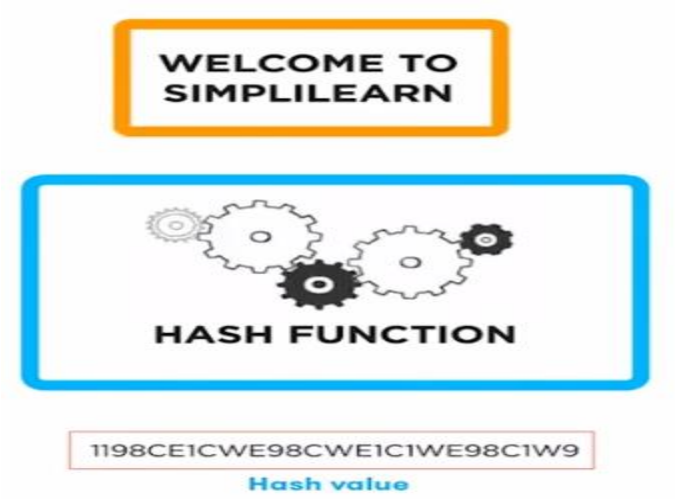


Fig.4 Login diagram for a fresh application.

After creating the account by each contractor, they will star apply for the bidding process. The advantage of using the blockchain is if the contractor-1 is submitting the registration certificate same it can be accessed by the registration authority, similar to the tax authority. When contractor -1 submits the CPO it will be associated with the bank. All the documents which are submitted by the contractor-1 are created in each block should have access to all the authorities like registration, tax, bank and government. Similarly, contractor-2 &3 also will submit all the official papers to the bidding process. Each person's official papers are accessed by every person but it cannot be modified. Each document is created in the form of a block, using the SHA 256 Encryption the data is encrypted into 256 binary code data. The main advantage of this algorithm is data encrypted is not converted back by using the same algorithm.Fig.5 shows the SHA 256 Encryption algorithm. Fig.6 shows the blockchain diagram after creating the hash valve if once blocks are created any contractor tries to change the document the hash valve will not match the previous and preceding block hash valve so that we can remove the block.



.Fig.5 SHA 256 Encryption algorithm.

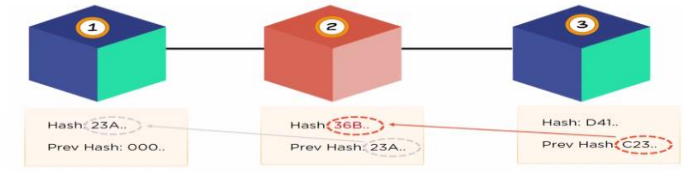


Fig.6 Representation of Blockchain hash values.

Each contractor is having the public key and a private key which is shown in Fig.7 the public key it may be the email address and private key it is a password or thanks to the emerging technology we can make the private passwords asa fingerprint. When the bid time is finished the contractor will come to know by himself based on the authority's decision. The hackers cannot modify the documents. If the contractor once submitted the documents it cannot modify again because of the use of the hash algorithm. Finally, the Fig.7 shows the step by step procedure of the smart contract process.

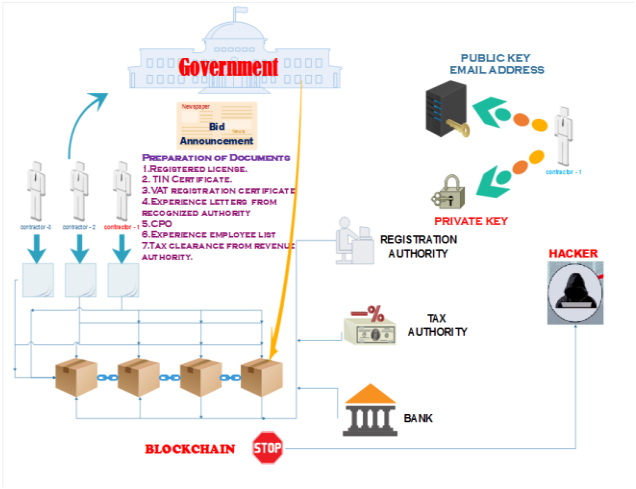


Fig.7 Smart contract by using the Blockchain technology

Transparency, faith, and morals are considered as authoritative elements by the contractor. It allows contractors to track the status of the contact from the moment of applying the bid until the announcement of the bid winner. And it creates a trustful environment between contractor and government without the need for a third party to establish the credibility and confidence of business transactions, as well as focus business processes on the sale and purchase without the need to pay percentages of profits to anyone.

4. Conclusion and Future Work:

The new evolutionary technology of Blockchain and its application to E-commerce is considered as a significant tool. It fascinates the new people, it creates a trusted environment and reliable transactions. Here in this paper the business-to-government (B2G) a smart contract application is considered for the evaluation of the blockchain and bitcoin for the smart contracts. Applying blockchain to the government contract bids the contractor will get the information from the initial stage to the final stage. In this model, three smart contracts are connected to business processes between government (registration, tax authorities, banks, Anticorruption Bureau etc.). The blockchain revolution is expected to be a successful or parallel alternative to the traditional process. It encourages the small contractors to carry out their work bypassing the brokers which they can save money. The proposed model combines the idea of a B2G and a blockchain technology in order to reach an effective, trust environment for the success of this type of contract and to mitigate worries between consumers. This model creates trust between the contracts and creates more possibilities to access their records always. One more advantage is documented once they create they can reuse again for the other contract applications which saves the time of work, the documents cannot tamper. It will decrease the worries between the contactors. Blockchain technology is having a diversity of applications it can be used for bank transactions, E-Commerce (C2C, B2B, C2B etc.) it can be implemented for the educational purpose in order to save the educational documents, financial sector, import and export, Insurance industries. Implementing the blockchain technology to the developing countries like Ethiopia from the initial stages the documents can be saved safely we can reduce corruption. Implementing the blockchain technology immigration services reduces terrorist actives.

This paper contributes expressively to the implementation of advanced technology and E-commerce which needs practical research for B2C to cover different areas of smart contract operations that support the conversion of traditional operations into digital operations. By incorporating the Blockchain technology all the country operations will be digitalized and can be saved safely.

Suggestion: ***"Implement the blockchain technology, make country digitalized, keep the documents safe and save the paper"***

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Bibliography:

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