Block Chain Technology: Smart Contract Application in the Real Estate Industry in Kenya

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Abstract: **Block chain is widely known as the underlying technology powering bitcoin. However, with the wide usage of technology, the block chain based smart contracts are being used to serve a wide range of data set such as financing, purchasing, leasing, sale and management of property transactions. This research embarked on determining the applicability of smart contract in the real estate industry. The researcher explored the usage of smart contract in management of property, purchasing, leasing and sales. Data was collected using secondary data from different articles and journals. From the findings revealed that, the real estate industry is transforming fast and there is need to have all the data in one place to reduce cases of fraud and simplify the title deed record process. Smart contract eases the lack of trust between the buyer and seller since with block chain, data is more transparent and there is accurate record keeping. It also provides an opportunity for auto-confirmation by the land registries and enhances transparency. It was further revealed that with smart contracts, several entitles can modify the database including tenants, owners, investors and lenders. Recommendations indicate the real estate industry should adopt block chain due to its usefulness and ability to create a difference in the industry.**

Keywords: **Block chain, smart contract, real estate.**

I. INTRODUCTION

The real estate sector is a key economic development sector that builds our country, Kenya. However, it is seriously being affected by incidences of corruption, theft and fraud which pull the economy down. One of the key reasons includes the wrong recording of land transactions by government organizations in certain areas. In order to correct this, we need to have accurate data recording of the property values such that, all parties are aware of all prices and sizes, which is where smart contract through block chain comes into perspective.

Blockchain is a digital peer-to-peer network that allows transactions between two parties without the need for an intermediary (Swan, 2015). Block chain is a global distributed ledger allowing transactions within seconds globally, with minimal application fee. The technology reduces use of brokers in the real estate industry (Ngo, 2016). The most commendable feature is that it can assist in avoiding cases of theft in the real estate industry. It uses an open ledger system where a form of identity to and from which the transactions are done is recorded in the form of a code. When transacting, the process is recorded by users in the network where parties exchanging various assets can verify (Malvinya, 2015).

According to Shrivas and Yeboah (2018), smart contract module is optional and only applicable to Stateful Blockchain that is, a type of Blockchain that provides smart contract and transaction computing capabilities (Hileman & Rauchs, 2017). It also supports multifaceted business logic, its optimization and preserves logic states. It encapsulates business logics that can be implemented using any programming language like go, solidity, java, Rust, C++, etc. They are lines of code stored in blockchain. The contracts operate without human interference. It acts as an escrow although automated. This implies that with the smart contracts you could exchange anything of value, including property or any other legal binding document which is done only once the specified conditions set for the contract are met.

In the recent past, the real estate industry was a booming sector in our economy. However, the industry is slowly declining as high price ceiling hits the industry. Problems with the current regime include excess paper work, lengthy bank transfer and high agent fees. Aside from that, the regulation agencies have power to manipulate transaction records such that the buyer is not able to distinguish between a fake and genuine title deed. This has also led to high tax evasion or under filing of tax due to falsification of information.

According to the Kiplagat (2019), a whopping sum of 490 million shillings were lost by Equity and CBA (now NCBA) banks due to multiple listing emanating from a title deed fraud used as a collateral to secure a loan. The real estate sector in Kenya lacks trust and transparency in data and record management. The title records are maintained in local spaces which are being manipulated by the officials, therefore public, and the banks need to be more protected through a more reliable and transparent innovation that are cost and time efficient. With blockchain technology, one may be able to save time and money. According to a research done by Uzair et al. (2018), on the impact of the blockchain technology using smart contract in Pakistan the researcher discovered that with the technology, transparency of operations would increase and the government would be able to tax all the transactions accurately.

This research seeks to cover the knowledge gap on the use of blockchain technology in the real estate industry. Most

researches have focused on the impact of blockchain technology internationally however; less research has been done on the impact of blockchain technology in Kenya. Therefore, the main question the researchers seek to answer is what is the effect of blockchain smart contract in the real estate industry? Therefore, the primary objective of this paper is to determine the effect of blockchain smart contracts in the real estate industry. The researchers seek to unravel the application of the blockchain technology in the real estate industry in Kenya. The remaining sections of the paper are organized to; section two contains the literature review and section three methodology. The findings and discussion are in section four while the conclusion is in section five.

II. LITERATURE REVIEW

Blockchain technology according to Nakamoto (2008), who did a paper on bitcoin termed it as a peer-to-peer (P2P) network. Blockchain is the technology that is used in bitcoin and it can be applied in several sectors of the economy. The researcher in this paper concentrated on the wide usage of blockchain smart contract in the real estate industry. Dijkstra (2017) and Veuger (2017) did a research on the application of bitcoin technology in the real estate industry and discovered that it could lead to transparency and efficiency in the sector. Additionally, it could assist in building trust among the counter parties involved and banks could use to discover the risk involved in transacting with a certain real estate agent (Dijkstra, 2017). According to Malviya (2017), who did a research on blockchain for commercial real estate and discovered that blockchain technology application in the real estate leads to speeding up of transactions, saving on the cost of certain fees and also provides extra security. The researcher further discovered that startups joining the industry have fewer chances of succeeding than those who are well established in the sector.

Mashatan and Roberts (2017), did a research on the real estate transaction process based on blockchain based technology and found out that the blockchain based bidding and transaction system which they introduced could help improve the transaction experience for each of the participant by increasing transparency and the accuracy of data. Blockchain is a nascent technology and its applicability in the real estate industry would improve security, eradicate fraud cases and speed the whole transaction process. According to Uzair, Mansab & Karim (2018), research on the impact of blockchain technology on the real estate industry using smart contract and discovered that it could be used to ensure that transactions in real estate are transparent in nature and government can be able to tax them accurately. The study was conducted in six months' period in Karachi Defense Housing Authority which has 8 phases with residential and commercial properties.

Smart contract is the computer embedded program designed to digitally assist the negotiation of contractual terms directly between users (Hu, Liyange, Manzoor & Thilakarathna,

2019). According to Junis, Prasetya, Lubay and Sari, (2019), the single-point-of-failure decentralized system introduced using blockchain based smart contract can prevent double spending syndrome and Sybil-attack. The system can be used in different fields including government agencies and Nairobi Stock Exchange for investment purposes. According to Krisna, Aakash, Sivaprakash and Madhumathi (2019), who did a research on the secured real estate transactions using blockchain technology and discovered that it could help resolve trust issues among parties transacting and increase transparency in data and record management.

According to Tibury, Rey and Schyff (2019), who did a research on the business process models of blockchain and the South African real estate transactions, discovered that blockchain smart contract can change the way the real estate transactions are done to ease fraud cases and protect title ownership. The key challenge lies in stakeholders embracing the technology and adapting to change in the current operations in the real estate industry.

A research done by Deloitte (2017), on how blockchain based smart contracts could revolutionize the commercial real estate and discovered that it could be used to ease operations such as financing, purchasing, leasing and management transactions in the real estate industry. The researcher clearly demonstrates some of the advantages of blockchain technology in the real estate sector given special attention to its usefulness and reasons it should be implemented. According to the research, some of the key reasons why the real estate sector should implement blockchain include:

1.   The need for a common database

The researcher discovered that with one common database it would ease the transaction process of changing a lease agreement or land title from one person to the other as they could all do it in the same platform. Furthermore, they could do it at work, home or even internationally. In other words, the parties do not have to meet to purchase or sell a land.

2.   Lack of trust among entities

The process of buying, selling and leasing of property involves different parties who are new to each other and most of these people have data integrity concerns due to cases of conmen and fake title deeds. With the usage of blockchain based smart contract the parties can be able to follow up the whole process and easily detect a fake title deed or a land imposter.

3.   Many entitles can update the database

Management of real estate properties requires different personnel such as the land registries, owner, buyer and investors. Therefore, the smart contract can assist in creating a platform where all these entities can be able to update the information regarding the properties.

4.   Reduce the usage of intermediaries

The process of transacting title deeds can be reduced where the owner and buyer can be able to transact directly without the usage of more personnel.

5.   Transaction dependence

The process of buying a property could be transacted using the smart contract where the purchase is officially made after title clearance and confirmation. In other words, it a step by step procedure where you cannot proceed to the next step unless you complete the previous task. This would ease cases of fraud and theft in the real estate industry.

III. METHODOLOGY

The current study was carried out as a desk study, this methodology was selected due to the fact that blockchain in real estate transactions is an advanced use of technology yet to be thoroughly explored. Therefore, carrying out desk research is to review previous research findings to gain a broad understanding of the field. This research connects literature, practitioners and developments of blockchain. It seeks to bring theory and practice together to unravel the usage of smart contract in the real estate industry. The researchers focus on implementation of blockchain technology in the real estate industry in Kenya

IV. FINDINGS AND DISCUSSION

The findings from the desk research revealed that blockchain could be categorized differently. For instance, based on the nature of data accessibility it can be categorized as Public Blockchain, Private Blockchain, Community/Consortium Blockchain and hybrid Blockchain (Lin & Liao, 2017). On the basis of need of authorization to participate in Blockchain, it can be categorize as Permissionless Blockchain, Permissioned Blockchain and Hybrid Blockchain (Michael, Cohn, & Butcher, 2018). While as far as core functionality and smart contract support is concern, it can be categorized as Stateless Blockchain and Stateful Blockchain (Hileman & Rauchs, 2017).

Real Estate has grown to be the most lucrative and less risky investment over time generating billions of money daily. However, like any other business Real estate scams have gradually become common especially in Urban cities in Kenya. In the course of this research, depending on the environment, various types of real estate frauds were revealed but the most prominent ones in Kenya situation are but not limited to Title Deed Fraud, Online Seller Scams, Multiple Property Listing and Housing Cumulative Investment. Therefore, the following areas of application are identified:-

Application of Blockchain Smart Contract in a Property Management, Purchasing and Sales

Land Registration on Smart Contract

The land registration process and mortgage lending can be done though blockchain based smart contract. The blockchain connects the buyer, seller, lenders and land registries all to one single network and smart contract acts as the road network guiding the property sale transfer while moving all across the distributed ledger network. The figure below shows the sample of a smart contract through blockchain technology.
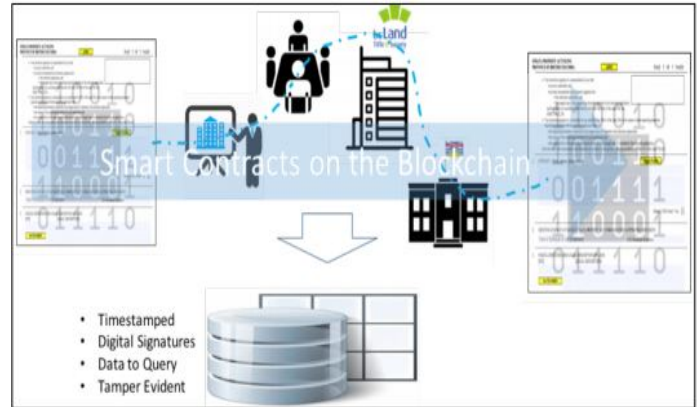

Figure 1: Blockchain Smart Contract (Miller, Bennett, & Kara, 2019)

The blockchain based smart contract in a land registration process:

- Uses digital signatures as an approval of a signed transaction submitted to blockchain
- It indicates the data required by the client to approve a transaction
- It assists in automation process on escrow payments based on specified rules
- It indicates when a task has been completed through the digital signatures and data collected so that they can move to the next step
- It agrees for participant having a user interface to complete the transaction required to codify the contract

The diagram below shows an example of a blockchain based smart contract used in Sweden during a certain land registration process.

Figure 2: Smart contract extract (Miller, Bennett, & Kara, 2019)

Usage of Blockchain Smart Contract in a Lease Transaction

During a lease process there several steps that take place from the lessor to the lessee before the property is finally transferred to the lessor (Delloite, 2017). The steps include:

Property Search on Blockchain

The lessee and lessor list their necessities on the blockchain based multiple-listing services (MLS). The MLS allows both parties to check available listing with the specified requirements.

1. *Property inspection and visiting*

After listing, the brokers discuss the contractual client requirement and go for a pre-visit and inspection of the property

2. *Signing and negotiation*

Both parties negotiate the value and terms of the property deal. Then proceed to send a letter of intent from the lessee to the lessor stating their interest in the same property.

3. *Background search of the property though smart identities*

The lessee uses blockchain based digital identities to conduct a thorough background search of the property and transactions of the lessor.

4. *Head of agreement Preparation*

The account does a head of agreement preparation using clauses and agreed terms between the counterparties.

5. *Agreement of the lease using smart contract*

Terms and conditions stated on the agreement are recorded on the blockchain based smart contract. The smart contract then initiates a payment deposit of advance rent through the bitcoin wallet on the payment interface.

6. *Payment and Cash management on smart contract*

On the basis of the agreed upon terms, the smart contract initiates the lease payment. Once the lease process is complete, smart contract transfers the security deposited to the lessor.

V. CONCLUSION

Due to the problems that are currently being encountered in the real estate industry in Kenya, blockchain smart contract can be used to resolve some of these problems. Blockchain's applicability in the real estate sector cannot be undermined as it can lead to increased efficiency in buying of land in Kenya. Possible area of applications the real estate industry will include purchasing and leasing transaction. The potential benefits in the real estate industry include assisting in easing cases of fraud and corruption, building trust between the lessee and the leaser, quick and easier transfer of title deed and increase in tax compliance, the study therefore recommend its adoption in Kenya.

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