



The LNM Institute of  
Information Technology

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## **Entangled Blockchains in Land Registry Management**

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# Introduction

Registering and maintaining the record of lands in India has been quite difficult and time consuming over the past few years. Many challenges like disputes caused between multiple departments handling the same land record or multiple registration of same piece of land, etc can be solved using 'Entanglement of blockchains'.

Government has been practicing to maintain data of lands in digital form (as it is difficult to do so in physical form) and they achieved it to a good extent. But, this comes at the cost of security. Only digitization of land records doesn't provide the security of the data. Government authorities also face many issues of trust since there are not strict patterns of particular documents by which someone can claim land belonging to them which leads to a major concern of land allocation procedure since many conflicts can arise or someone can fake claim.

Hence, the idea of implementation of Blockchain based framework for Land Registry was proposed.

It not only aims to resolve existing problems such as synchronization or coordination of data across various departments but will also stop certain attacks and helps maintain the integrity of data over the entangled network. Not just that, it can also expedite the business processes concerned with lands, considerably.

In India, land ownership is generally determined through deeds of sale (acquired at the time of local registration) and other papers. All of these papers, however, do not prove the ownership claim, but rather demonstrate a duplicate and lead to property seizure. We frequently notice errors, obsolete, and unsupported data on Land Records due to poor administration and lack of coordination among all departments (Revenue agencies and the Department of Stamps and Registration). This dispute is

a big contributor to the patent problem since it takes several years of records to substantiate a copyright claim.

We know that blockchains remain unmodified, spreads remain spread, and recorded transactions cannot be changed. Furthermore, the broad architecture of blockchains aids in preventing illegal change of data.

## **LITERATURE SURVEY**

Blockchain has a number of useful characteristics for safeguarding data and conducting transactions. It was mostly utilized for cryptocurrency transactions in its early years, but it currently has applications in practically every sector [11,13]. The potential benefits of blockchain for poor countries are described by Kshetri [1]. The potential of blockchain to bridge the gap between formal institutions is discussed in this report. Land holdings in over 61 nations have resulted from a lack of adequate administration.

Blockchain ensures transparency by providing a transparent, tamper-proof ledger of transactions. [12] Immutability, decentralization, and traceability are the major characteristics of blockchain that make it beneficial in the registration industry. The issues in the property and land system are discussed in paper [2], as well as how blockchain-based technology can address these challenges. According to a Goldman Sachs study, integrating blockchain in real estate might save 2 to 4 billion dollars per year. This research also looks at how blockchain and smart contracts could be used to replace expensive and time-consuming functions.

[3] is concerned with the legal aspects of blockchain in real estate. The report discusses how blockchain may efficiently implement all of the required criteria without the need for any legal authority. Blockchain also eliminates the need for a third party to enforce rights and regulate transactions. [4] discusses the weaknesses and how they are exploited by the government. The consensus protocol for providing security is also the focus of this project. [5] outlines the use of blockchain in the European land

registration system. This paper discusses the benefits, such as enhanced confidence and efficient processing with cost savings, but also raises concerns about the absence of independent verification and external control over the transactions. Also covered are the debates around Blockchain land ownership in Europe. In Germany, [6] discuss the transition from electrical to blockchain-based land registry systems. The paper discusses the key benefits of blockchain's core functionalities, as well as the system's legal and technical challenges. [7] Discusses the current state of India's landholding system, focusing on concerns and unresolved litigation in Indian courts. It proposes a multi-blockchain system in which each blockchain stores different types of data and the blockchains are connected to form a land holding system. [8] discusses the land disputes in Cyprus and how blockchain technology can help solve these issues. The study emphasizes the use of blockchain technology in resolving property rights conflicts on the island. [9] discuss a situation in the Netherlands that is similar. It covers some possible methods for improving the real estate business using volume blockchain technology. At the same time, the study discusses social ramifications, underlining the importance of converting the entire value chain to blockchain. It begs the question of whether blocks are a true game changer or merely a technological blip. Many countries, particularly developing countries, have conducted experiments in recent years to replace the existing land owning structure with blockchain-based solutions. The main goal is to improve data security as well as cost and speed efficiency.

## **Issues with land registry?**

To support land title market transactions, the land registry system requires a large volume of registration papers to be stored on central databases. This method is prone to numerous forms of manipulation and adjustments, thus manual records are kept that can be changed with the help of corrupt registry office staff, and it comes with a lot of overhead in terms of time, storage requirements, and expense. Using technology, land registry offices

have taken initiatives to promote openness and transparency. Data copying and replication secure the central storage by transferring data from a single database to a distributed database.

Land Registry is a tedious job, require plenty of documents for verification and verifying it physically is very tedious job to do, this is one of the major problem with the system, But this can be solved by just digitization of files. But if someone tries to perform insider attack and manipulate the data would create a financial loss, so blockchain is required to restrict anyone to edit even employees.

The Land Registry problem is more often prone to NRI people, like if you are living in the USA and want to invest in Indian Land, you buy a particular piece of land and fly back to US. But No one is taking care of your land which implies someone can claim false acquisition and take over your land based upon manipulated documents. Since, it is very difficult to manage your Land from overseas which causes more often these types of problems.

### **How Problem Is Solved?**

Blockchain is used to implement the land owning system. It protects the data while also making it transparent. It successfully addresses all of the issues that plague the traditional land holding structure. Hash cryptography is used to protect transaction data, which is impervious to change or deletion. The distributed peer-to-peer network and consensus process further adds to the data's security.

### **POTENTIAL BENEFITS**

The decentralized standard system for land registration records will minimize the need for intermediaries, reduce the time and cost of the

process, and strengthen the process and build trust among the parties involved. The usage of Blockchain to record property rights will save money over time and provide a tamper-proof ledger book. Blockchain will help the judiciary resolve the bulk of civil property cases by reducing the cost and time required for the registration process. Some of the benefits of using Blockchain in land registration systems include:

1. **Transparency:** Every node has a complete transaction overview and history that can be seen at any time from any location.
2. **Increased trust:** Immutable record keeping and data verification at various nodes help to build trust.
3. **Improve predictive capability:** Predictive capability improves when history information held at multiple nodes can be traced back.
4. **Reliability:** The blockchain-based system stores data in multiple locations. Consensus methods ensure that information changes only when all relevant parties agree. Adding transactions via a consensus mechanism provides you more control over the database.
5. **Cost reduction:** Because no human third party is involved in data gathering and validation, costs are lowered.
6. **Lower energy usage:** Energy consumption is reduced thanks to increased efficiency and network-based transaction processes.
7. **Security:** Data is stored across many systems using encryption technologies to avoid tampering without proper authentication.
8. **Ease of access:** Multiple nodes store data, allowing for easier and faster access.

9. **Privacy:** The information must be safe from eavesdropping. To keep information protected from unauthorized access, users need secret keys or access methods.

10. **Reducing corruption:** Due to the secure and dependable technique of transferring and modifying ownership data, distributed ledger storage helps to prevent land ownership corruption.

11. **Error reduction:** Human errors are reduced when transactions are automated.

12. **Data integrity and higher quality:** The data is kept original since it is not accessed by hackers or unauthorized users.

## **IMPLEMENTATION: ALGORITHM FOR LAND REGISTRY USING BLOCKCHAIN**

During the land trading process, the buyer and seller must first sign a pre-agreement contract (smart contract) and then submit a transfer request to the register office. The registry office validates the seller and buyer's identities before verifying the land title using surveyor and departmental data. The financial transaction record is validated, and appropriate income in the form of transfer charges and taxes is collected, after which the transfer request is processed further. After all of these stages are completed, ownership is transferred, an ownership certificate is issued to the buyer, and an updated record is forwarded to all departments involved. Pre-agreement Id, which saves the seller and buyer IDs as well as agreement details, is used to verify the seller and buyer.



## **ALGORITHM FOR LAND REGISTRY USING BLOCKCHAIN**

This study proposes a novel architecture for a blockchain-based secure and reliable land register system, as shown in Figure below. The suggested system, which is tamper proof and dependable, uses blockchain to store land data.

### **Step 1: Preparation**

Pre-Agreement Created includes following information

- Sign Msg from both buyer and seller
- Seller address
- Buyer address
- Transfer Amount
- AcceptOffer

### **Step 2: Request to sell**

Now, The Pre-Agreement is sent to the registry office to lock the file until the transaction is completed or rejected.

### **Step 3: Verification**

Now, The Registrar officer will verify all the payments transferred for the same land acquisition, Pre-agreement and after verification, the Registrar officer pass the file for further approval by all the departments.

### **Step 4: Approval**

Now, The Approval of all the departments is necessary to further go with the process, after approval from all the departments notifications to buyers are generated.

### **Step 5: Notification**

After, All departments approval registrar notifies the buyer to go with further process to acquire this land.

Step 6: ***Begin the fund transfer***

Now, Fund transfer begins.

Step 7: ***Approve the fund transfer***

Approving the fund transfer involves the Bank verifying the funds transferred against the pre-agreement title contract and approving them. On the Pre-agreement title contract, mark the payment as received.

Step 8: ***Transfer detail***

The bank sends the transfer details to the registrar office when the fund transfer has been approved in *step 7*.

Step 9: ***Transfer of ownership***

Now, The Registrar office finally sends information to the buyer and seller that the transfer for ownership is initiated and completed.

Step 10: ***Record update***

The ownership transfer certificate was updated to all departments in the land register system using blockchain hash in the final *step 10*.

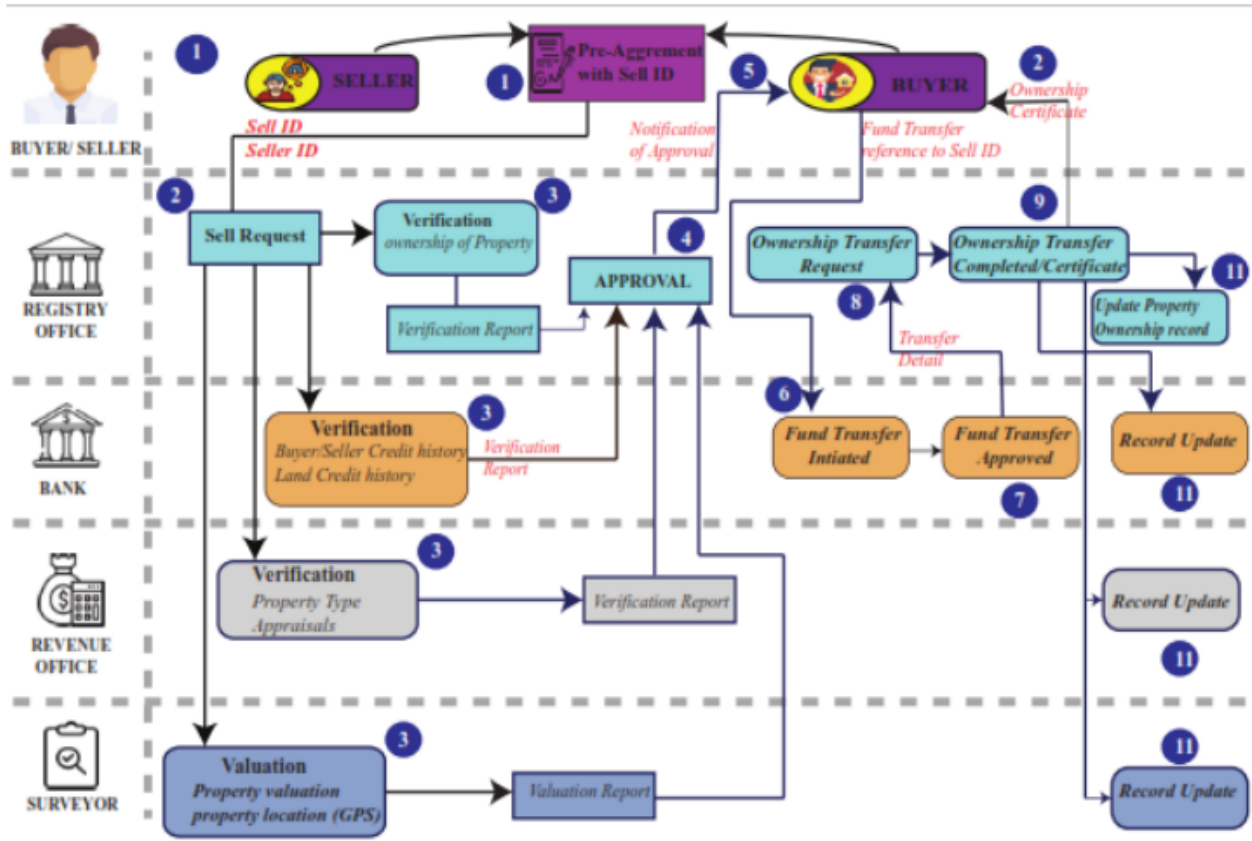


Fig- 1.1 Image taken from [20]

## RESULT

Blockchain is used to implement the land owning system. It protects the data while also making it transparent. It successfully addresses all of the issues that plague the traditional land holding structure. Hash cryptography is used to protect transaction data, which is impervious to change. Data security can further be enhanced by a distributed peer-to-peer network and consensus process .

Three Stages -

- Blockchain
- Front end
- Wallet

The wallet retrieves property information, and the user purchases the property by clicking on a button. As soon as a miner mines a transaction, it is stored on the blockchain. The property that was sold is no longer available for transactions. As a result, the possibility of duplicate selling is eliminated.

The shortcomings of traditional landing systems are successfully addressed in this work. It protects the security and transparency of our data. All of the blockchain properties help to improve their respective fields. Data security and immutability are provided via hash cryptography and the consensus procedure.

The use of a public-private key pair enables for transaction monitoring, and automating the entire process decreases the risk of human error. It has a significant impact on the current system.

It eliminates all forms of fraud, minimizes the expense of the middleman, and lowers the risk of human error. Essentially, it offers a new, enhanced alternative to the current land-holding system that is more secure, time-efficient, and cost-effective. There is still room for improvement. The user interface might be made more interactive by improving it.

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