L-Chain: Land records and transactions on Blockchain

Motivation

In a developing country with a large population like India its essential to have well maintained land records and titles. They are essential for projects like public infrastructure, agriculture and housing development. Unfortunately land records in India are poorly maintained. They are maintained by various stakeholder government departments which work in silos and at different levels of bureaucracy. This leads to discrepancy among the records across various departments. It also leads to cases where the records do not match the actual state on the ground. Land ownership in India is presumptive thus it depends not on clear land title document but on registered sale deed which is a record of the property transaction. Thus the buyer has to make sure there is no discrepancy in historical sales deeds. This leads to non-transparency in land transactions which allows cases of benami transactions where the land is transferred to a person but is paid for by another person.[1]

Unclear land records have also increased cases of corruption among village level government officials. It fosters disputes among villagers over land, results in litigation and loss of social harmony. It especially affects farmers as due to unclear land records they are unable to access institutionalized credit and insurance. This makes them seek credit from private lenders which may give rise to predatory lending and indebtedness. This proposal aims to address these issues by using blockchain and smart contracts.

Proposed Solution

Current land records mainly consist of three parts– RoR(Record of Rights), Spatial data and Mutation records. RoR consists of names of owners, type of ownership, rent or revenue of land etc. Spatial records consists of land boundary, plot area, land use, land topology, sketch of the property etc. Mutation data consists of records of historical transfers of the property. We propose to represent a piece of property as a smart contract on Ethereum blockchain. Each smart contract corresponding to a property will have its unique address on the blockchain. This smart contract will store RoR and spatial data. It will provide an ABI(Application Binary Interface) to users through which they can do transactions. The mutation records will automatically maintained due to immutable nature of blockchain. This contracts will be owned by the entity who is responsible for creating smart contracts from existing digital land records.

Every landholder will have a single unique address on a blockchain through which they can carry out land transactions. The identity of the user will be tied to the address and user will be authenticated each time they wish to transact (Note that this is unlike today's cryptocurrency markets where there is no link between users identity and wallets addresses). Some of the data in the smart contract will be publicly accessible via its unique address, while some will be restricted. Modifications to the data in the smart contract can only be made by the owner of the property and in some cases responsible government agencies.

This system will especially be useful in rural India where the property owners could use this solution for making land transactions provided that they have access to this thorough BharatWiFi. They will not need to maintain any paper documents, travel to faraway government offices, pay hefty bribes to officials and wait for long time to get their transactions processed. This will also reduce workload on respective government authorities, lower costs of maintaining records, reduce cases of missing and forged documents, enable easy revenue collections, allow easy computation of farmer subsidies. Financial institutions involved in crop insurance or agricultural credit face major hurdles due to erroneous or missing land records which in turn affects agricultural production. These institutions can use smart contracts to intelligently gather data for their models. We will illustrate how this solution will work with following examples. Transactions on land properties can be of two types, one that involves buying or selling of property(land trade) or one that does not involve trading of land.

Transactions involving land trading

Initially seller would bid on a land by using publicly available ABI for smart contract of that land parcel. Before doing this they can check the details of the land, owner and also verify past transactions. The buyer would look at the bid, verify identity of the seller and then approve the deal. In case of multiple people owning the land a poll[2] can be conducted by smart contract to take approval of all the people involved. After all parties agree to the deal, the seller can send tokens worth the agreed amount to the smart contract. The contract will then verify the amount and send it to the sellers wallet. After this RoR records in the smart contract will be modified to reflect new owner. Along with this the new owner will get privileged access to the contract while sellers privileged access will be revoked.

Transactions not involving land trading

A frequent land transaction which does not actually involve land trading is modification of RoR especially in cases of lands owned by joint families. In such cases the one of the owners can propose a modification to existing RoR and submit it to the contract. The contract then conducts a poll among the owners whether to accept the proposed modification or not. This eliminates the existing problems like forgery and corruption which are pervasive among these kind of transactions. Another case of such transaction is that of revenue collection. The revenue department can check how many properties does a person hold across the country, size and use of that property etc. and send a bill of final amount to the contract. The contract will then notify the owner and they will send tokens worth the amount to the contract which will forward it to the revenue department. This brings complete transparency in tax collection which today's system lacks. Its also possible to flag and revoking privileged access of an individual for non-payment of tax. Similarly several other land transactions can also be carried out using ABI provided by smart contracts.

Implementation Challenges

A major hurdle in implementation of this project would be to create smart contracts from the digital records which are available DILRMP[3] project because of the sheer scale of the project. Also implementing smart contract based land records system alone might not be very effective as today's manual survey methods susceptible to error and corruption. Thus its essential to use GIS and other smart mapping techniques to make the proposed system work at its full potential. Another probable challenge in future will be making sure that this solution can scale with fragmentation of larger properties into smaller land parcels.

References

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