
USING BLOCKCHAIN TECHNOLOGY TO MODERNIZE LAND RECORD MANAGEMENT IN INDIA

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I – INTRODUCTION AND PROBLEM STATEMENT

The existing land record system in India is infected by deep-rooted structural inefficiencies which significantly complicates legal clarity, economic development and administrative efficiency. The existing poorly structured land record system is a matter of high significance. It is estimated that 7.7 million people are affected by conflict over 2.5 million hectares of land, which threaten investments worth \$ 200 billion.¹ Land disputes is one of the sectors that clog up the judicial system on all levels, causing high pendency and excessive burden on the courts. About 25% of all cases decided by the supreme court involve land disputes, out of which 30% concern disputes related of land acquisition. Data shows that 66% of all civil cases in India are related to land/property disputes.²

The problem is time sensitive, as justice delayed is justice denied. The average pendency of a land acquisition dispute, from creation of the dispute to resolution by the Supreme Court, is 20 years. It is a matter of concern as such long time periods clog the entire legal system leading to further pendency.³

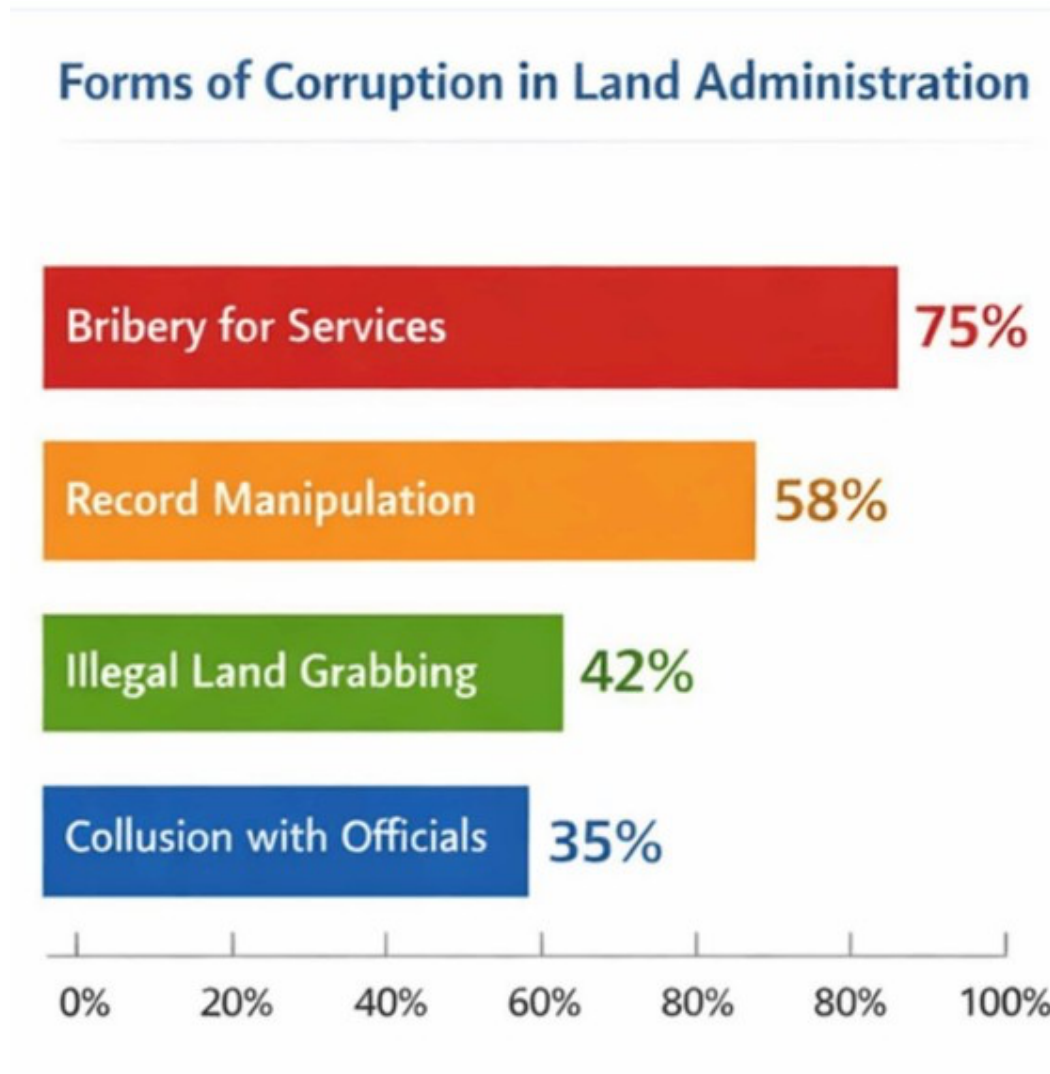
Another issue with current land record system is that administration of records today is not free from bribery and corruption. A ground level analysis by Justly shows that 75% of all kinds of forms of corruption in land administration is for acquiring of services including land recording and registration. (graph-1) This creates a lack of trust in the Indian society. Land records can be changed by a corrupt officer in favor of the bribe giver. This further leads to more disputes in court and even causes significant emotional and mental distress to the genuine holders of the property.⁴

1 Land Conflict Watch, *Tracking the Cost of Land Conflicts in India*, Land Conflict Watch (2023), <https://www.landconflictwatch.org>.

2 NITI Aayog, *Land Records and Titling: A Roadmap for Reform* (Government of India, 2021).

3 Daksh, *Access to Justice Survey: Pendency in Indian Courts* (2017), <https://www.dakshindia.org>.

4 Justly, *Forms of Corruption in Land Administration in India*, Justly Research Brief (2022), <https://www.justly.org>.



Graph 1: Forms of Corruption in Land Administration (Justly).

Another core issue with the current land record system is that the data base is decentralized. Even though in recent years, the state has tried to digitize the land records, but that database is prone to cyber security frauds. Hackers can conveniently manipulate the data or even destroy it. India Cyber Threat Report 2025 tells that on average, India every minute faces 702 potential cyber security threat alerts. This report substantiates that the risk of a cyber-attack on the Indian land record database.⁵

The Government of India has taken numerous actions to digitize land records through various initiatives such as Digital India Land Records Modernization Programme (DILRMP). DILRMP was launched to create a transparent and efficient system and it focuses on computerization of

⁵ Data Security Council of India, *India Cyber Threat Report 2025* (DSCI & Seqrite, 2025).

Record of Rights (RoR), digitization of cadastral maps, integration of registration and land records and development of modern record rooms. According to the latest figures, over 95% of villages have digitized land records and more than 93% of registration offices computerized, showing considerable progress. Although it is a great initiative and a step forward to transparency. The current system is not a complete solution.⁶

II – ADVANTAGES OF A PROPER LAND RECORD SYSTEM

A proper and effective land record system is essential and necessary for a country like India. The way land data is dealt with today is ineffective, inefficient and flawed. India must take inspiration from countries like Sweden, Georgia and UAE. These three countries have witnessed significant improvement in their land dispute resolution system since they have revolutionized their land record system. The table below gives a comparative analysis of the 4 systems.⁷

Table 1: Comparative Analysis of Land Record Systems – India, Sweden, Georgia and UAE

Country	Before Digitalization	After Digitalization
India	66% civil cases land-related; ~7.7 million affected; ~20-year resolution time; fragmented paper-based systems	Partial digitization; improved access in some states; still fragmented; disputes persist
Sweden	Manual registry; 3–6 months transaction time; administrative delays	Fully digital system; 2–10 days registration; blockchain pilots; near-zero disputes
Georgia	15–30 days registration; corruption risks; bureaucratic inefficiency	Blockchain registry; minutes to 1 day process; reduced fraud; high transparency
UAE	Manual/semi-digital; weeks-long processing; reliance on intermediaries	Blockchain system; minutes–hours transactions; fully digital records; strong data security

Out of the above four examples, Georgia and UAE have performed the best in terms of reducing the judicial burden. It is important to note that both these countries have successfully incorporated the blockchain system in managing their database. These countries have successfully reduced the risk of corruption and cybersecurity risks as well.⁸

⁶ Department of Land Resources, Ministry of Rural Development, *Digital India Land Records Modernization Programme: Progress Report* (Government of India, 2024), <https://dilrmp.gov.in>.

⁷ World Bank, *Doing Business: Registering Property* (World Bank Group, 2020), <https://www.doingbusiness.org>.

⁸ Vlad Krupskiy, *Blockchain in Land Administration: The Georgian Experience*, World Bank Annual Conf. on Land and Poverty (2018).

Digital records ensure reduction of frauds on the ground level. Though the current digitization process is better than the historical means of land record India used, it still lacks in some ways. The current Indian digitization system is a centralized system, meaning that all the land record data is stored in one single database, that is with the government of India. This means that if a user edits the information in the database, the entire data base is manipulated and will show the same edited information. It is also tough to find out at what stage the edit was made and the data was manipulated. This leads to lack of transparency and trust in the minds of people of India.

A good solution to this could be a decentralized system. A decentralized system in data management distributes data storage, processing, and governance across multiple independent nodes or business domains, rather than relying on a central authority. This model enhances resilience, privacy, and scalability by eliminating single points of failure, commonly utilizing technologies like blockchain and peer-to-peer (P2P) networks.⁹

To have a trustworthy and reliable land record system in India, we need a decentralized, highly protected, blockchain based user-friendly system. The paper will discuss this in detail in the coming sections.

III – WHAT IS BLOCKCHAIN AND HOW IT CAN HELP

Blockchain is a shared immutable ledger that facilitates the process of recording transactions and tracking assets across a business network. Anything of value can be tracked and traded on the Blockchain network. A Blockchain is a distributed database, which is shared over a computer network. Blockchain stores information electronically in a digital format to make transactions secure.¹⁰ Blockchain is a new technology, which is known as Distributed Ledger Technology (DLT). In this, one block is connected to another block. These blocks cannot be hacked.

⁹ Don Tapscott & Alex Tapscott, *Blockchain Revolution: How the Technology Behind Bitcoin and Other Cryptocurrencies Is Changing the World* 19–22 (Penguin 2016).

¹⁰ IBM, *What Is Blockchain Technology?*, IBM (2024), <https://www.ibm.com/topics/blockchain>.

Blockchain technology aims to keep documents digitally secure. You can take Google Doc as an example to understand Blockchain technology. When we create a document and share it with a group of people, the document is distributed instead of copied or transferred. But, Blockchain is more complex than Google Doc. Simply put, Blockchain is known as Distributed Ledger Technology, which makes any digital asset immutable and transparent through the use of decentralization. (see Figure 1)

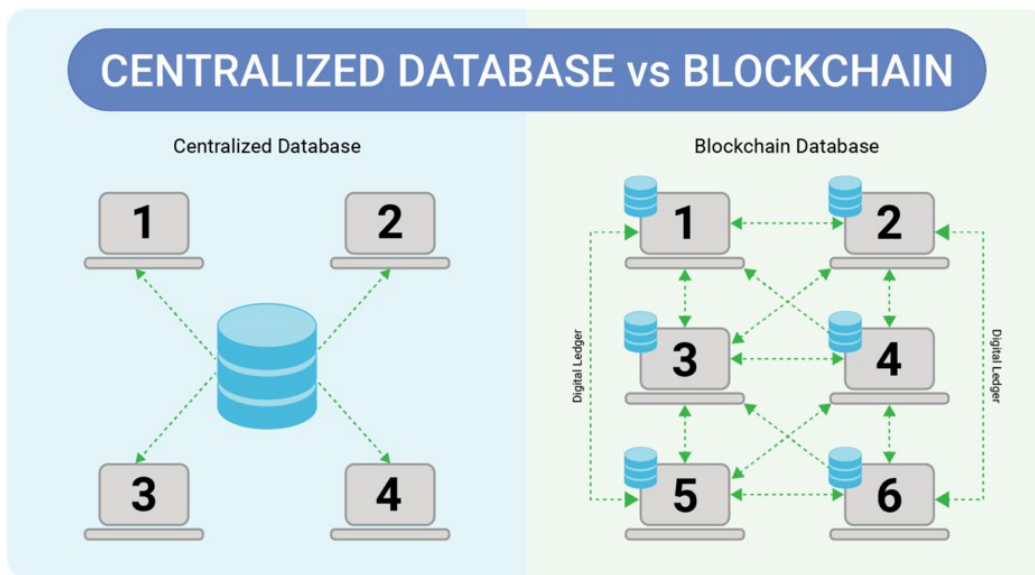


Figure 1: Centralized Database vs. Blockchain Database.

The use of blockchain technology in land record management systems is getting a lot of attention. It is a way to solve old problems like fraud and lack of transparency. Blockchain is a ledger that is decentralized and cannot be changed. This means that when information is added to it cannot be altered without everyone agreeing. This makes it very good for keeping secure land records.

One of the things about blockchain is that it makes the system transparent. All parties involved including the government and financial institutions can see the version of land records. This reduces mistakes. Makes it impossible for someone to claim ownership of a property that is not theirs. As discussed earlier in the paper, some countries, like Georgia have already started using blockchain to record land transactions. This has improved trust and reduced corruption.¹¹

¹¹ *Id.*

Blockchain also helps to stop fraud and unauthorized changes. In some countries like India land records are often changed illegally. With blockchain every change is recorded and can be tracked. This makes it very hard for someone to make changes. Blockchain also makes transactions more efficient by using contracts. These contracts can transfer ownership of a property automatically when certain conditions are met. This reduces the need for intermediaries. Makes the process faster.¹²

Using blockchain also saves a lot of time when it comes to registering property. What usually takes weeks or months can now be done in minutes. Another plus point about blockchain is that it keeps data secure. In centralized databases, if one central device is hacked and the original data manipulated then all the systems connected to the central system will be compromised and will display the manipulated information. Unlike databases, blockchain spreads information across a network. This makes it very hard for hackers to get into the system as each device stores the data independently. For example, In a centralized database system, if the central device is hacked and the last holder of property in a deed is changed from Mr. X to Mr. Y, then all the devices connected to that central device will show that Mr. Y is the current holder of the property. Whereas if any device is hacked in a decentralized database like blockchain then the information in all the devices will vary from one hacked device as the devices work independently.¹³

Another added benefit of blockchain is that data cannot be deleted in a block chain. Data can only be modified not erased. For example, again if the central device is hacked and the last holder of property in a deed is changed from Mr. X to Mr. Y, then all the devices connected to that central device will show that Mr. Y is the current holder of the property.

In a blockchain backed system, the hacker or user cannot manipulate the data by removing Mr. X's name from the deed. The only thing they can do is that they can add a separate independent block that Mr. Y is the new holder of the property after Mr. X. Blockchain as the name suggests is a 'chain' of information interlinked and connected to the past information. (see figure 2)

¹² Nick Szabo, *Smart Contracts: Building Blocks for Digital Markets*, 16 *Entropy* 50 (1996).

¹³ Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System* (2008), <https://bitcoin.org/bitcoin.pdf>.

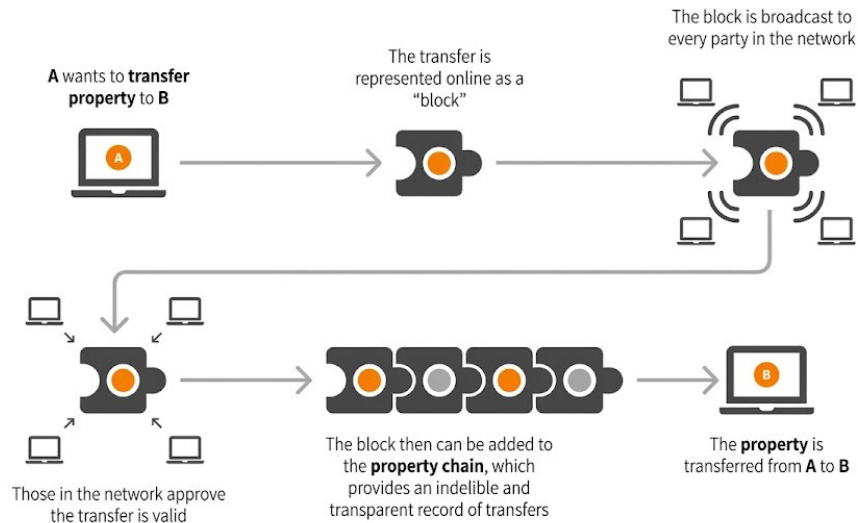


Figure 2: Recording a Property Transfer on the Blockchain.

IV – IMPLEMENTATION OF BLOCKCHAIN SYSTEM IN INDIA

The blockchain based land record management system in India needs to be set up in an organized way. We need to make sure that everything is done in order and that we use the technology to make it work well. The first step is to give each piece of land a Unique Property Identification Code. This code will be like a name or a unique identity for each property. It will be linked to the holder's identification like their Aadhaar or PAN. This way it can be made sure that we know who holds each piece of land.¹⁴

An important part of the blockchain based land record management system in India is how we record who owns the land. Of just saying who owns it now, we will keep a record of all the people who have owned it in the past. This means that we can see who sold it to who and when. This makes it very hard for someone to cheat or lie about who owns the land in turn blocking the risk of data manipulation. The blockchain based land record management system in India also helps people trust the system because they can see the historical transfers of the land they are planning to invest in.

¹⁴ Unique Identification Authority of India, *Aadhaar Linkage with Land Records: Policy Note* (UIDAI, 2023), <https://uidai.gov.in>.

To make it easy for people to use the blockchain based land record management system in India, we need to have an application that people can use to get information about their land. This application should be like DigiLocker which is user-friendly and convenient to use. It should let people see who owns the land look at maps and see all the documents related to the land. We can also use information systems to show the boundaries of the land and other important information. This will help people see what is going on. It will highly reduce the number of land dispute litigation in India.¹⁵

It is also important to note that the common citizen gets the support when they need it. The state should also add in 365 days open, toll-free helpline number and chat box assistance in all local and regional languages to resolve the queries of the users of the Application.

We should start by testing the blockchain based land record management system in top ten smart cities of India. Bhubaneswar, Indore, Pune, Ahmedabad, Coimbatore, Kochi, Hyderabad, Jaipur, Lucknow, and Visakhapatnam are great cities to start with. These smart cities are classified based on how tech-ready they are. After implementation in these cities, government must test how beneficial it was and must make a cost benefit analysis report and should start expanding the project to other cities and rural areas as well.¹⁶

This will help in ensuring that the blockchain-based land record management system in India is effective and efficient. The goal is to have a system that's safe, transparent and uses the latest technology to manage land records in India. The blockchain-based land record management system in India is very important for the country to achieve it's *Viksit Bharat 2047 Plans*.¹⁷

15 Ministry of Electronics and Information Technology, *DigiLocker: Annual Performance Report* (Government of India, 2024), <https://www.digilocker.gov.in>.

16 Ministry of Housing and Urban Affairs, *Smart Cities Mission: Status Update* (Government of India, 2024), <https://smartcities.gov.in>.

17 NITI Aayog, *Viksit Bharat @2047: Voice of the Youth* (Government of India, 2024), <https://www.niti.gov.in>.

V – CHALLENGES IN IMPLEMENTATION

One big problem is that there is a lack of awareness of blockchain technology. People need to understand the benefits and how to use blockchain technology. Since blockchain is still pretty new a lot of people including government officials and people in the industry do not really get how it can help. This lack of understanding makes it hard for a lot of people to trust it and use it. Government must give a proper and free of cost briefing of the new blockchain technology backed land record system to all the stakeholders to ensure smooth transition.¹⁸

Another major issue is that there are no laws to support the use of blockchain technology. India has some laws, like the Information Technology Act, 2000 and the Indian Contract Act, 1872. These laws do not cover everything about blockchain technology. For example, it is not clear if smart contracts are legal. The laws also do not say anything about using blockchain technology for land registration. This makes it hard to know if blockchain technology is legal and if it can be used in systems. The government needs to carefully pass legislations and amendments to ensure the legality of the blockchain technology backed database.¹⁹

There are also issues with blockchain technology because of its decentralized nature. Blockchain technology works across different networks and is not limited to one place. This makes it hard to know which laws apply and how to solve problems. This makes it hard to enforce rules and solve problems in public blockchains with many people involved.²⁰

18 NITI Aayog, *Blockchain: The India Strategy, Part I* (Government of India, 2020), <https://www.niti.gov.in/blockchain>.

19 Information Technology Act, No. 21 of 2000, *India Code* (2000); Indian Contract Act, No. 9 of 1872, *India Code* (1872).

20 Primavera De Filippi & Aaron Wright, *Blockchain and the Law: The Rule of Code* 33–58 (Harvard Univ. Press 2018).

VI – CONCLUSION

India's land record system currently, is inefficient and causes heavy judicial workload, disputes and chaos. Using blockchain technology can help solve these problems. It makes land records transparent, secure and easy to manage. The records are stored in a way that prevents anyone from changing them, making the land transfer process more transparent and efficient. However, for a blockchain backed land record system to work in India effectively, certain environmental, legislative and technical challenges will have to be solved. If India does this in an step-by-step way it can make its land governance system better. It will be more reliable, transparent and ready, for the future and will help India achieve its *Viksit Bharat 2047* mission.²¹

²¹ See NITI Aayog, *supra* note 14.