Block-Chain Land: A Secure and Immutable Real Estate Record Keeping System

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Abstract- The real-estate business has extensive struggled with the requirements of fraud, intermediaries, and other concerns to be faced in record-keeping. As conventional record-keeping approaches are not sufficient in this digital era, even those methods found quite time-consuming, and horizontal to scam, which wear away trust between the parties and constraint communication. The aim of this research is to propose the development of Block-Chain (BC) Land for Immutable Real Estate Record Keeping System. BC Land is a sophisticated mechanism which could be utilizes as a prior advantage to get a safer, active efficient, and untraceable way to maintain real estate information. With the use of a prominent BC and smart contracts, the system will automate various activities such as ownership transfers, speedy process of transaction and elimination of middle intermediaries. BC Land provide a widely distributed ledger which ensure transparency and immutability and enable produce a transparent & verifiable record of ownership that may be used as ownership proof in court and for dispute resolution. All the steps including planning, designing, testing, deploying and regular maintenance were carried out to create BC Land application.

Graphical user interface and system designed were made carefully to meet stakeholder requirements and ensured the usability. The development stage provides for flexibility and modification during the designing stage, which ensure system evolves in response to stakeholder feedback. As per the findings of this study and integration of BC Land, real-estate transactions could become more efficient & effective, transparent, and secure. By eliminating of middle intermediaries and providing a solid-proof record of ownership, the system aims to strengthen parties' trust, save money, and increase the general efficiency of the real-estate sector.
The system tested properly in a virtual environment, its usability, security concerns, and interoperability functions assessed to ascertain how effective BC Land is. Moreover, A comparative analysis done with conventional record-keeping methods to trace the major advantages and affordability is proposed. Results reveals that BC Land has the potential to entirely alter the real estate market by boosting transparency, reducing scams, and eliminating the middle intermediaries' interruptions in the record-keeping process. This study will fill the scarcity within the domain of BCT in real estate and pave the way for future advancements.

Index Terms- Block-Chain Technology, Real Estate, Smart contracts, Transparency

I. INTRODUCTION

The global market value of the real estate sector is over $228 trillion, which makes it a significant and complicated sector of the economy. Since new technology and laws are always being developed, the sector is continually changing. Although Block-Chain Technology in only now beginning to be used in the real estate sector, there is a lot of potential for this technology to completely transform the sector. BC is a decentralized system that enables secure, transparent, and immutable transactions through the use of a shared ledger. This makes it a promising technology for the real estate industry, which is currently plagued by fraud, errors, and slow transaction times..

In this digital era, growing BCT advancements and incorporates a multitude of applications could be applied in several dynamic sectors. Particularly in the real estate sector, which significantly improves the trust of data security in financial transactions and eliminates the third party agents in purchasing of lands between different parties. The seller and the buyer will mutually agree to the purchase price and duration to close the deal. BCT will help in reducing the risk of data tampering because in paper based record management system even in centralize record management system data tampering can easily be done but in BC storage once the data has been published it can neither be changed nor tampered.

The real estate industry suffers from issues related to record keeping, including fraud, errors, and the need for intermediaries. Traditional systems of record keeping are slow, inefficient, and vulnerable to tampering, leading to a lack of transparency and trust. Also with the inclusion of middleman between the buyer and the purchaser also increases the cost of purchasing and becomes an issue for both parties. Data corruption and tampering is also easily possible in traditional file based or centralized record management system. BCT has appeared as a sophisticated solution, but constraints remain in its diffusion, such as privacy, security, and interoperability. This study attempts to address these challenges by developing a secure and decentralized real estate record keeping system using BCT. The proposed system, BC Land, aims to provide a tamperproof and efficient ledger for recording real estate transactions, with a focus on privacy, security, and interoperability. The purpose of this study is to design a system which eliminate intermediaries, streamlines the real estate transaction process, and improve trust, reducing costs and improving efficiency. In BC land smart contract will be programmed to solve issues regarding selling and purchasing of properties and storing data in BC via secure manner.

II.   RELATED WORK

The real-estate business has continuously struggled to maintain accuracy within the records, as the nature of problems become quite serious such as scams, errors, and the involvement of third-party. Since the conventional Real- estate record keeping system could be tampered, ineffective & in-efficient, to scam and misinformation. The emergence of BCT would have the potential to transform the complete real estate transaction automatically along with security, making it quicker, more secure, and more efficient. [1,2].

Various BC-based solutions have been suggested for real estate record-keeping systems. These methods are being used as BC tools to keep record of real estate transactions, providing a secure and transparent record of ownership. Each transaction in the system recorded as a block in the BC, which is subsequently changed in cypher by cryptographic methods and then linked to the previous block, establishing a set of blocks which could not be tampered /altered without the intervene of the network [3]. Previous studies have shown that BCT could improve the efficiency and transparency of real estate transactions [4].

Deloitte states that BCT can provide greater transparency and security in real estate transactions and efficient solution to the longstanding problem of real estate record keeping [5]. The main objective of citing literature is to analyze, assess, the existing body of knowledge pertaining to BC [6]. The advantages of using BCT in the real estate industry include security, transparency, and efficiency. While challenges are complexity, regulation, lack of awareness. Previous related studies suggested that BCT has the prospect of revolutionizing the real estate industry. Although there is still a research gap on the use of BCT in the real estate industry. This study attempts to fill the possible scarcity by designing and developing a prototype i.e BC-based real estate record keeping system.

A. Block -Chain (BC)

Initially, the BCT was primarily utilized for implementing the Bitcoin cryptocurrency. It offered an immutable ledger that could be accessed and verified by all participants in the cryptocurrency network. However, the concept of BC soon evolved into a distributed ledger system, where each node in the network receives a copy and can record and validate events without the need for intermediaries [10]. The BC functions as a chain of blocks, with each block simulated across all knots. Blocks act as containers that store data, current hash addresses, references to earlier blocks, and nonce. Each block is securely linked to its preceding blocks, and every transaction recorded within the BC is immutable, making it highly resistant to data tampering. Consequently, the BC serves as an ideal solution for recording land registry data, where data integrity is crucial element. Generally, BC is categorized as either a public or private BC [11].

B. BC Relation with Land Management

BCT has the make possible to revolutionize land management systems by bringing transparency, security and efficiency to the process. Land administration includes various functions such as property registration, transaction management, dispute resolution and ensuring proper land use. However, traditional land management systems often suffer from problems such as fraud, corruption, lack of transparency and heavy paperwork. This is where BCT can make a big difference [12,13].

In addition, BC-based land management systems can facilitate better land management and planning. Governments and land agencies can use BC to monitor land use, monitor environmental impacts and enforce zoning regulations. This can contribute to sustainable agriculture, urban planning and prevention of unauthorized cultivation or encroachment [19]. While there are several benefits to adopting BC in land use, there are challenges to overcome. Attention must be paid to interoperability and standardization of data between different systems and jurisdictions to ensure seamless integration. Sensitive national privacy concerns must also be carefully addressed.

However, BCT has huge potential to transform land governance systems by increasing transparency, efficiency and trust. Its ability to provide a secure and immutable record of land transactions, streamline processes through smart contracts, resolve disputes and improve land use makes it a promising solution for future farming [20]. As more countries and organizations explore and adopt BCT, we can expect significant advances in land use.

C. Requirements of BC in Land Information System

Considering the fact that some BC technologies have a number of supposedly advantageous benefits on the real estate industry. As an alternative, you should also think about the standards that must be accomplished. The seven prerequisites put proposed by Graria and Melon (2018) for a successful BC ledger are listed in [23].

Registries Must Be Digitized:
BC uses a computer algorithm to make sure the data entered is authentic. Everyone wants the same digital data to be certified in the same format, which is why this algorithmic method is referred to be a decentralized system. A paper document cannot likely be sealed, however it might be possible to scan the paper document and seal it. However, each scan of the same hard copy would have a different spread than the original due to tiny variances in the copies. No physical or digital document offers a single verifiable version of the data, as decentralization enables BC to be minimized to minimize document changes. In order to add a record to the BC, it must first be completely digitalized. It's interesting to note that Georgia and Sweden have completely digitized their land record systems.

Multi-Signature Wallets:
A private key, frequently kept in a safe online wallet, is required to access current BC databases. This key is only known to the actual owner of the property. Theft, loss, misplacement, or tampering by a third party of a user's private key or wallet might cause issues. Only linked key holders can register or transfer assets thanks to the cryptography utilized in the BC. In the event of an error, there must thus be a way to reset a property related to

a key. Multiple signature wallets that need to verify a certain number of keys before a transaction can be made could be one approach. A registrar or notary may sign a transaction in a private BC system as well.

Private or Hybrid BC:

BCs are digital ledgers that can be either private, public, or both. Two parties interested in the transaction accept it using their public keys only on the public chain. The only way for a second event to fix the old record is if fraudulent information is frequently input and discovered. Resolving property title disputes in the chain's audience can be challenging in contexts like litigation and cultural heritage. Officials who have registered with the system can access a private hybrid chain where decisions are tracked, and a public hybrid chain can be used to guarantee the accuracy of essential document summaries. Public BCs are decentralized, ensuring that the amount of storage space available when linked to a computer over the internet is constrained [24]. Documents, names, maps, plans, etc. must all be included in records. Public BCs can only contain a certain amount of data, thus all papers must be saved elsewhere. The solution is to keep all records on a dedicated server and transfer the corresponding hashes to the BC. Registries can employ a private BC to handle particularly demanding data storage if a BC-based record is required instead of the related hashes. With the proper keys, anyone can send legitimate events on public BCs, regardless of who or what they are. In order to guarantee that only parties whose identities have been validated are happy with the authorities' activities, a private BC is crucial.

Accurate Data:

It's crucial to make sure that BC data is accurate because immutability is something that BC deserves. Errors exist in all contemporary records, digital or paper based. However, before developing an immutable platform, the registry needs to be updated and cleaned. In addition, there is a chance that disagreements will resurface years after the record has been cleaned.

Digital Registries Need Connectivity & Tech Alert Population:

The expenditures and maintenance needs of building a digital platform must be met by the BC used to implement a land register. The project is more appealing due to these elevated expenses, which could be the initial response. The new technology should reduce any potential maintenance costs, which is a plus. The hardware requirements for BCT are substantial [25]. It is difficult to presume that most public institutions will be able to handle these added obligations. The registrars are still in charge of maintaining the employment of network specialists even though the servers and software may continue to be used under contract. BC service providers are charged for network upkeep and troubleshooting expenses. BC records are inappropriate in jurisdictions where customers lack confidence in online transactions or where access is restricted.Training for Professional Individuals that involved with the Registry:

Professional organizations working with the BC registry must be included early. For instance, lawyers must take into account a number of factors, such as how BC papers are presented and interpreted as well as how the standards of proof correspond to BC outcomes. To perform all of these tasks, one must first be taught in the fundamental concepts, abilities, and terminology of BC. Although the technical and structural criteria for a BC

registry are clearly established, there is still much to be done in terms of capacity building and training. Engagement with the BC is not feasible without it.

III. METHODOLOGY

Iterative design and development will be the method used for creating the suggested system. With this method, stakeholder feedback is included into each step of the system's development. The following procedures will be followed in developing the system:

Design: The architecture has been designed in the first step which consist of identifying the elements of the system and the casual relationships b/w these elements.

Development: The development of system carried out in the second step which consist of coding and testing of each element.

Testing: The testing has done in third step which consist of testing the entire system including system for functionality, security, and performance.

Deployment: The deployment made at 4th stage which consist of handing over of the system. This stage ensures the availability of system to each stakeholder.

The data will be analyzing using the following techniques:

Coding: The thematic analysis approach has applied for data coding. This technique used because it helps to identify themes in the data and developing codes.
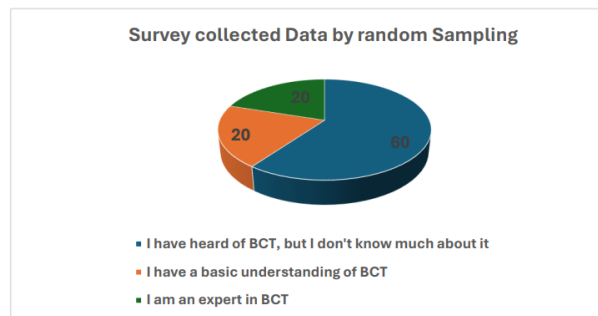
Quantitative analysis: The descriptive statistics has done from the survey data which include calculating the mean, median, and mode for each variable.

Qualitative analysis: Thematic analysis approach applied for interview's data as well as document analysis data. This helps to identify themes in the data and developing codes to represent these themes.

IV. ANALYSIS & RESULTS

The findings of the study can be presented in a clear and concise manner, using tables and graphs to illustrate the data. For example, the following table shows the results of a survey of real estate professionals on their awareness of BCT:

Fig.1: Data of survey collected by random people according to their choices

Survey collected Data by random Sampling

- ■ I have heard of BCT, but I don't know much about it
- ■ I have a basic understanding of BCT
- ■ I am an expert in BCT

The study's findings can be analyzed and interpreted to detect data patterns and draw conclusions. As an example, the below table displays the outcomes of a survey conducted among real estate professionals regarding their inclination to adopt BCT: Although the majority of real estate professionals are willing to use BCT in the real estate industry. This suggests that there is a strong demand for BC-based solutions in the real estate industry.

4.3 Comparison with Existing Solutions. The findings of the study can be compared with existing solutions to identify the strengths and weaknesses of the proposed solution. For example, the following table shows a comparison of the proposed solution with a traditional real estate transaction:

Feature	Proposed solution	Traditional real estate transaction
Security	Very secure, as all transactions are recorded on a public ledger	Less secure, as transactions are not recorded on a public ledger
Transparency	Very transparent, as all transactions are visible to all parties involved	Less transparent, as transactions are not visible to all parties involved
Efficiency	More efficient, as the need for intermediaries is eliminated	Less efficient, as intermediaries are required to handle transactions
User friendliness	More user-friendly, as the system is designed to be easy to use and navigate	Less user-friendly, as the system is not designed to be easy to use and navigate
Scalability	More scalable, as the system can be used to handle a large number of transactions	Less scalable, as the system cannot handle a large number of transactions

TABLE No. 1

The proposed solution has several advantages over the traditional real estate transaction. The proposed solution is more secure, transparent, efficient, user-friendly, and scalable than the traditional real estate transaction.

User Guide

Step by Step method for users to operate with Block chain Land Management.

Step 1: Revealing the Many Options

Action: Start exploring the app by clicking on "Property Listings." The Purpose of this step is to navigate through the exciting world of BC, a magical place filled with lots of different homes and investment options. Find your perfect home or investment opportunity in this special land of possibilities.

Step 2: Unlocking the Secret Room

Action: Start the login process by clicking the "Login" button, entering your information to access the digital safe space. This step Open the door to personalized areas, where security protects the digital fortress, making sure your information stays safe.

Step 3: Reaching the Crown

Action: Become the owner by logging in and getting a digital crown. Usually user will that you're like a digital noble in the BC kingdom, owning a property.

Step 4: Crafting Your Property Listing (Exclusive for Property Owners)

Action: Go to the "List Property" section, and fill in the details of your property. This makes enable property owners to write their real estate story on the special digital platform.

Step 5: Birth of Your Property

Action: Confirm the successful creation of your property listing, making sure it's all set. Purpose: Ensure the realization of your digital property, a confirmation that it's officially recorded on the BC records.

Step 6: Transformation of Property Information

Action: Use the "Update Property" feature to shape the story of your listed property. Purpose: Give property owners the digital tool to shape and mold the details of their BC-bound estates.

Step 7: Sounds of the Update

Action: Listen for the confirmation that your property information has successfully transformed. Purpose: Confirm the transformation of your property's essence, its change now recorded within the BC records.

Step 8: The Special Place of Ownership

Action: Look at the dedicated area revealing the list of properties under your digital control. Purpose: Provide a wide view, a digital space for users to enjoy their carefully chosen collection of owned estates.

Step 9: Beginning Anew Tradition

Action: Start the process by clicking the "New User" button. Purpose: Welcome new members into the special group, where signing up and creating an account open the door to personalized spaces.

Step 10: Stories of Beginners

Action: Explore the section that details the digital estates recently acquired by the newcomer. Purpose: Give new users a digital document of ownership, offering a glimpse into their beginning digital properties.

Step 11: Quest for Digital Territories (For Those Without Property)

Action: If you don't own any digital land, you can choose the "Buy Property" option, an invitation to start a quest. Purpose: Invite those without digital property to explore the available lands waiting to be purchased.

Step 12: Thinking About the Digital Art

Action: Take a moment to think before making the acquisition, carefully looking at the details of the chosen property. Purpose: Shed light on the path ahead, helping users make wise decisions before starting their digital property journey.

Step 13: Confirmation of Ownership

Action: Confirm the successful acquisition of the digital territory. Purpose: Verify the change in ownership, a confirmation recorded on the sacred BC, signaling the beginning of a new digital era for the user.
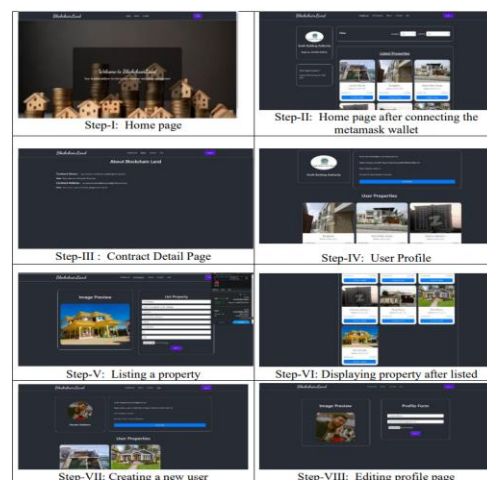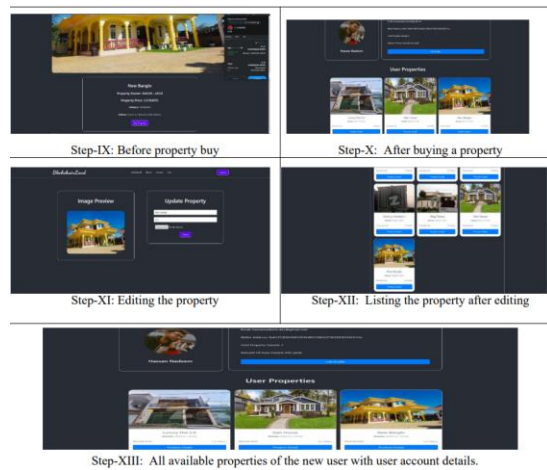

Step-I: Home page
Step-II: Home page after connecting the metamask wallet
Step-III: Contract Detail Page
Step-IV: User Profile
Step-V: Listing a property
Step-VI: Displaying property after listed
Step-VII: Creating a new user
Step-VIII: Editing profile page

FIGUER 2

FIGUER 3

V. CONCLUSION

In the complex journey of this intellectual exploration, the creation and development of "BC Land: A Secure and Immutable Real Estate Record Keeping System" represent a significant step forward in addressing the persistent challenges faced by the real estate industry. Issues such as middlemen, fraud, and complicated record-keeping have long hindered smooth transactions, creating a sense of distrust among those involved. This scholarly work set out on a transformative journey, aiming to provide, conceptualize, and bring to life a solution using the unique capabilities of BCT.

BC Land stands as a prime example of technological brilliance, serving as a guiding light for innovation and offering a secure and unassailable environment for real estate transactions. The clever use of a private BC and the implementation of smart contracts propel the system beyond the limitations of traditional record-keeping methods. In the virtual world of BC Land, the transfer of ownership is choreographed seamlessly through automation, eliminating the need for intermediaries. The acceleration of transactional processes becomes a rhythm, promising to transform the landscape of real estate dealings.

Carefully coordinating the planning, design, development, testing, deployment, and ongoing maintenance is a tribute to the steadfast dedication to nurturing a strong and user-friendly domain. The needs of stakeholders are prioritized, with the design crafted as a seamless tapestry that aligns with practical requirements. The iterative development process is a harmonious interplay, flexibly responding to stakeholder feedback and establishing the foundation for an adaptive and ever-evolving system.

Think of BC Land like a powerful force in the world of real estate. It's like a game-changer that ripples through all real estate transactions. Picture a moment of increasing efficiency, where things become clearer and more secure, like a new beginning. With BC Land, there's no need for middlemen; it's like a guarantee that proves who owns what, creating trust among everyone involved. It's not just about making things simpler—it's like a magic touch that cuts costs and makes everything in real estate run smoother.

Think of this digital Prometheus like a futuristic hero undergoing tough tests in a virtual fortress. Experts are carefully checking how easy, secure, and compatible it is. Now, imagine it as a dance-off with old-fashioned record-keeping giants—showcasing how much better and smarter the new approach of BC Land is, and how it's set to completely change the real estate scene.

In essence, BC Land reveals its power to transform the landscape of real estate—an indication of increased transparency, reduced deceit, and a move away from old-fashioned record-keeping practices. This scholarly work not only adds to our understanding of how BC can be used in real estate but also sets the foundation for future innovations in this ever-changing field.

Picture BC Land like a superhero in the tech world. It's not just another fancy gadget; it's a masterpiece that shows what happens when really smart solutions meet the big problems in the real estate world. As we finish this journey of ideas, imagine a real estate world that's super clear, super-efficient, and super strong, all thanks to the amazing powers of BCT.

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